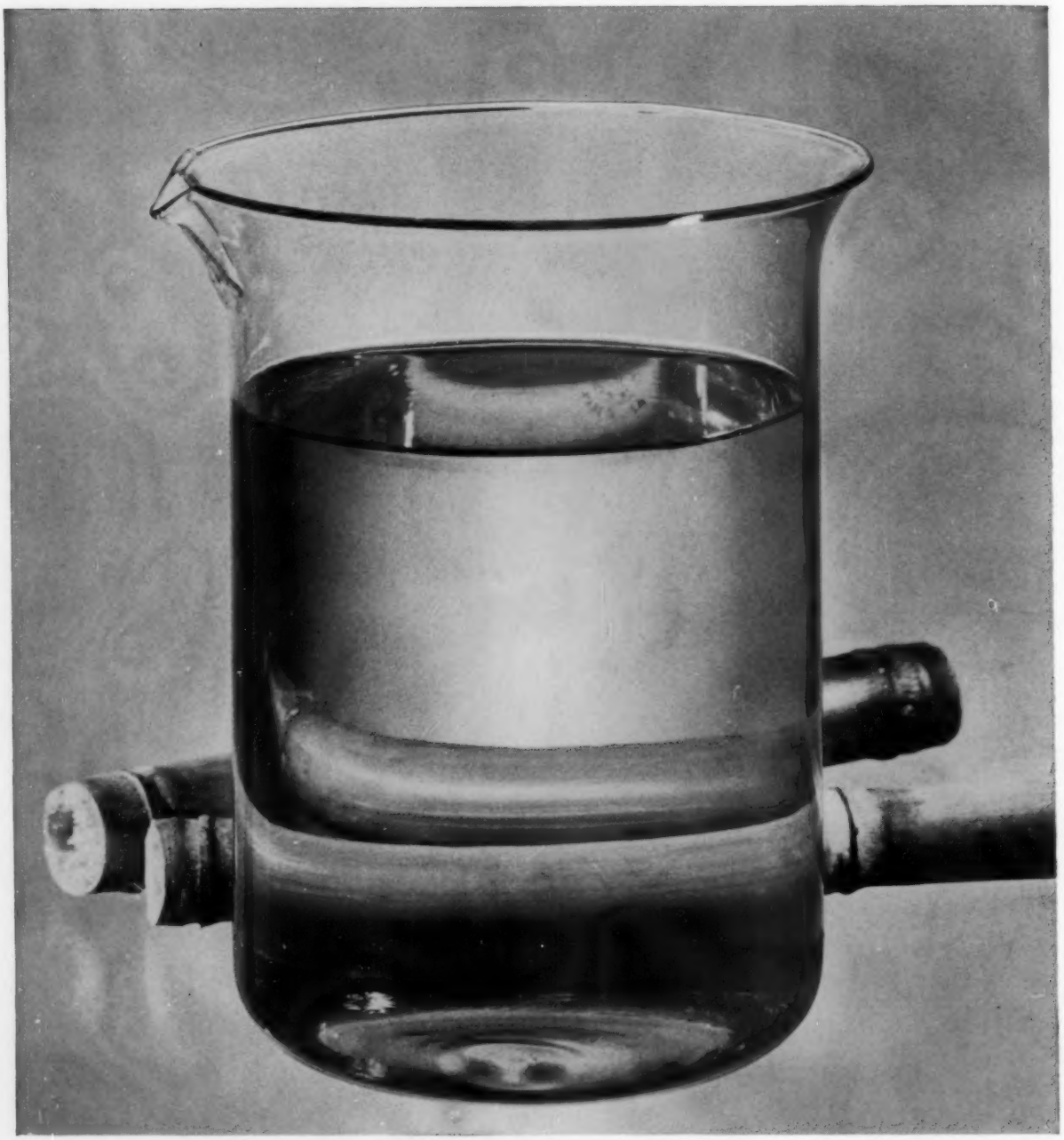
SUGAR y AZUCAR

JULY 1961



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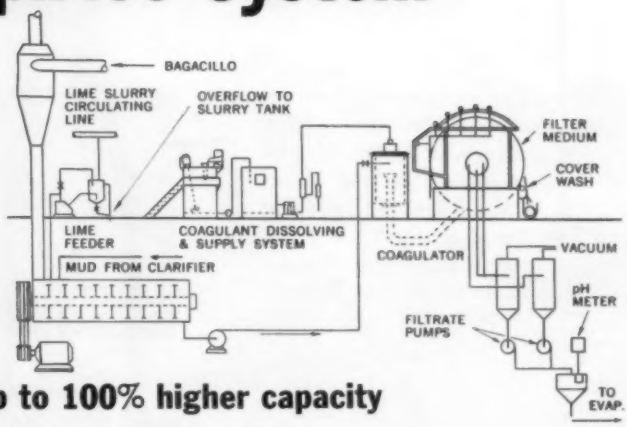

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Sugar y Azucar for July, 1961, Volume 56, No. 7. Published monthly by Russell Palmer Trust, Mona Palmer, Publisher, Publication Office, 109 Market Pl., Baltimore, Md. Editorial and executive office, 25 West 45th Street, New York 36, N. Y. Accepted as controlled circulation publication at Baltimore, Md.

SUGAR y AZUCAR

Volume 56 No. 7 July 1961

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COVER *The scene depicted on our front cover, typical of many tropical sugar ports a few years ago, is rapidly being replaced by bulk loading. As the United States turns to new sources of supply an increasing number of ports will find it convenient to install bulk loading facilities eliminating such picturesque but inefficient scenes.*

PORTADA *La escena representada en nuestra página frontal, típica hasta hace pocos años de muchos puertos azucareros tropicales, está siendo rápidamente reemplazada por los equipos de manipulación y embarques á granel. Segun los Estados Unidos tornan hácia nuevas fuentes de abastecimiento, un número creciente de puertos considerarán altamente conveniente, por substanciales ventajas económicas, realizar las instalaciones de embarque de azúcares á granel, eliminando éstas pintorescas pero ineficientes escenas.*

Publisher, MONA PALMER
Editor, E. W. MAYO, JR.
Editor, Spanish Section, MARIO A. MASCARÓ
Advertising Manager, R. E. SLIMERMEYER

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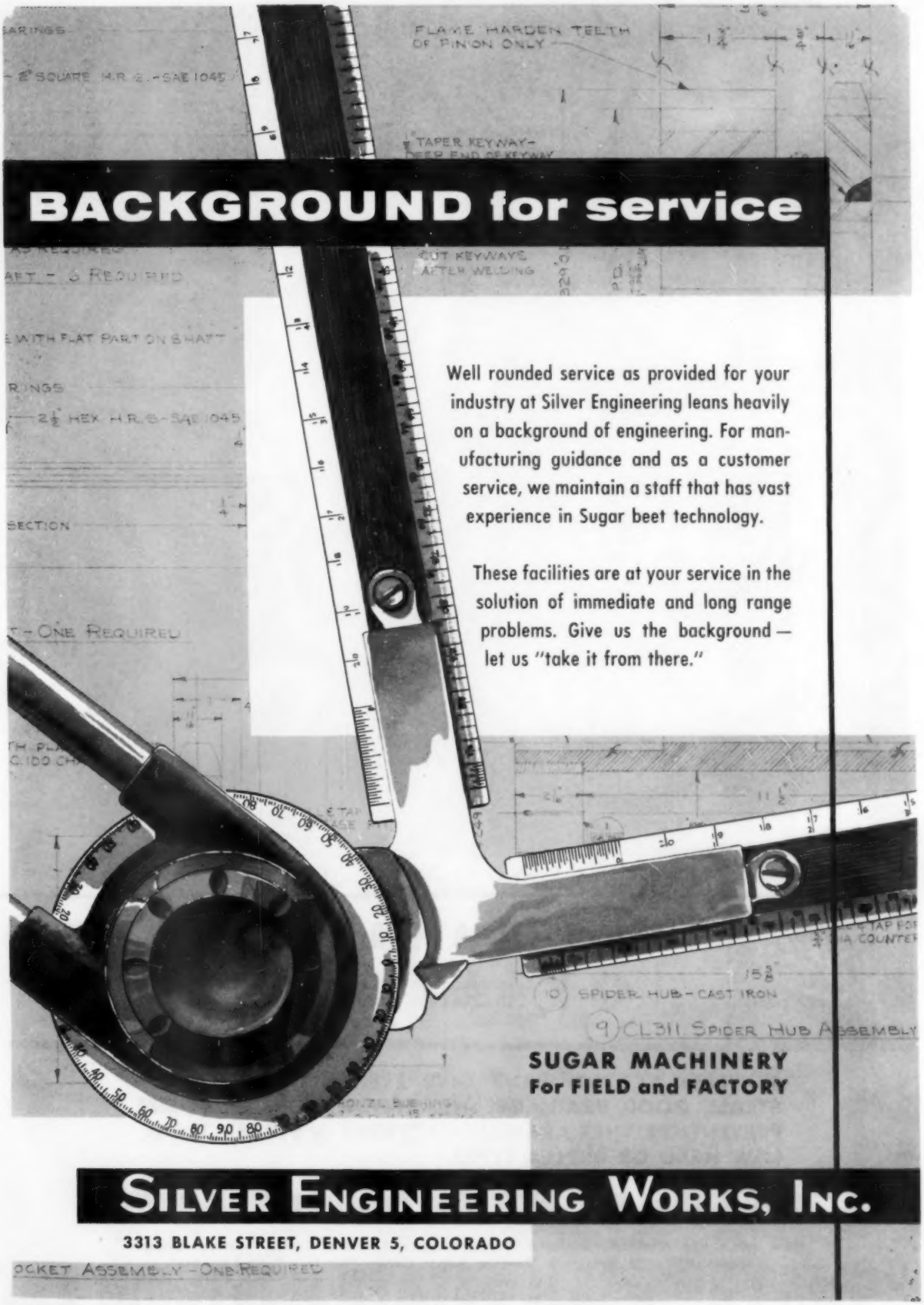
EDITORIAL and EXECUTIVE OFFICE:
25 West 45th St., New York 36, N. Y.
Tel.: JUdson 6-4820
EUROPEAN OFFICE:
G. L. Fetherstonhaugh, St. Paul's Corner,
Ludgate Hill, London EC 4, Tel. CITY 5318
PUERTO RICO:
Arturo Riollano, P. O. Box 506
Isabela, Puerto Rico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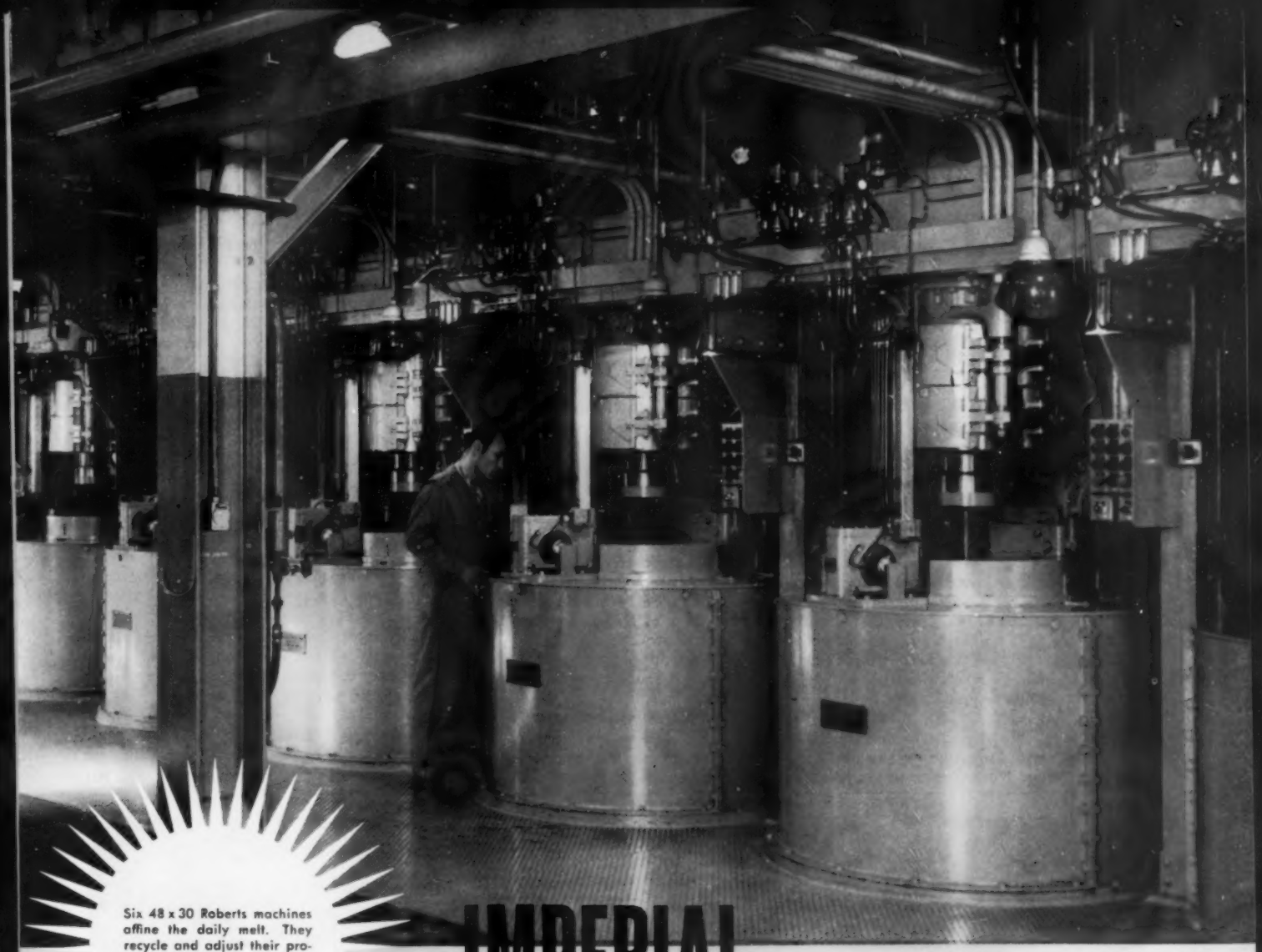

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EUROPEAN

News & Notes

By our London Correspondent

If the UK were to join the European Economic Community (EEC), known as the Common Market, "the guaranteed price for sugar would have to be abandoned in favour of a target price—a wholesale price—and its level may be only approximately maintained. Levies may be imposed on producers to help finance the cost of agricultural support."

EEC—made up of Belgium, France, the Netherlands, Luxembourg, Federal Germany and Italy—was organized under the Treaty of Rome of March 1957, and the above quotation is one of the main conclusions of the 98-page study "Agriculture in the Community" made by the National Union of Farmers of England and Wales and published as Vol. 16, No. 2, 1961 of its Information Service. This attempts to analyze the "Proposals for the working out and putting into effect of the common agricultural policy of the European Economic Commission," the executive organ of the Community, and to assess its likely effects on British farmers and growers.

Of the three alternative methods of market organization provided for in the above Treaty, in the case of sugar the Commission proposes to adopt "a European market organization" with a "European office" or marketing board. This will be under the Commission's authority and responsibility for such matters as market interventions, the imposition of levies, and the issue of import certificates.

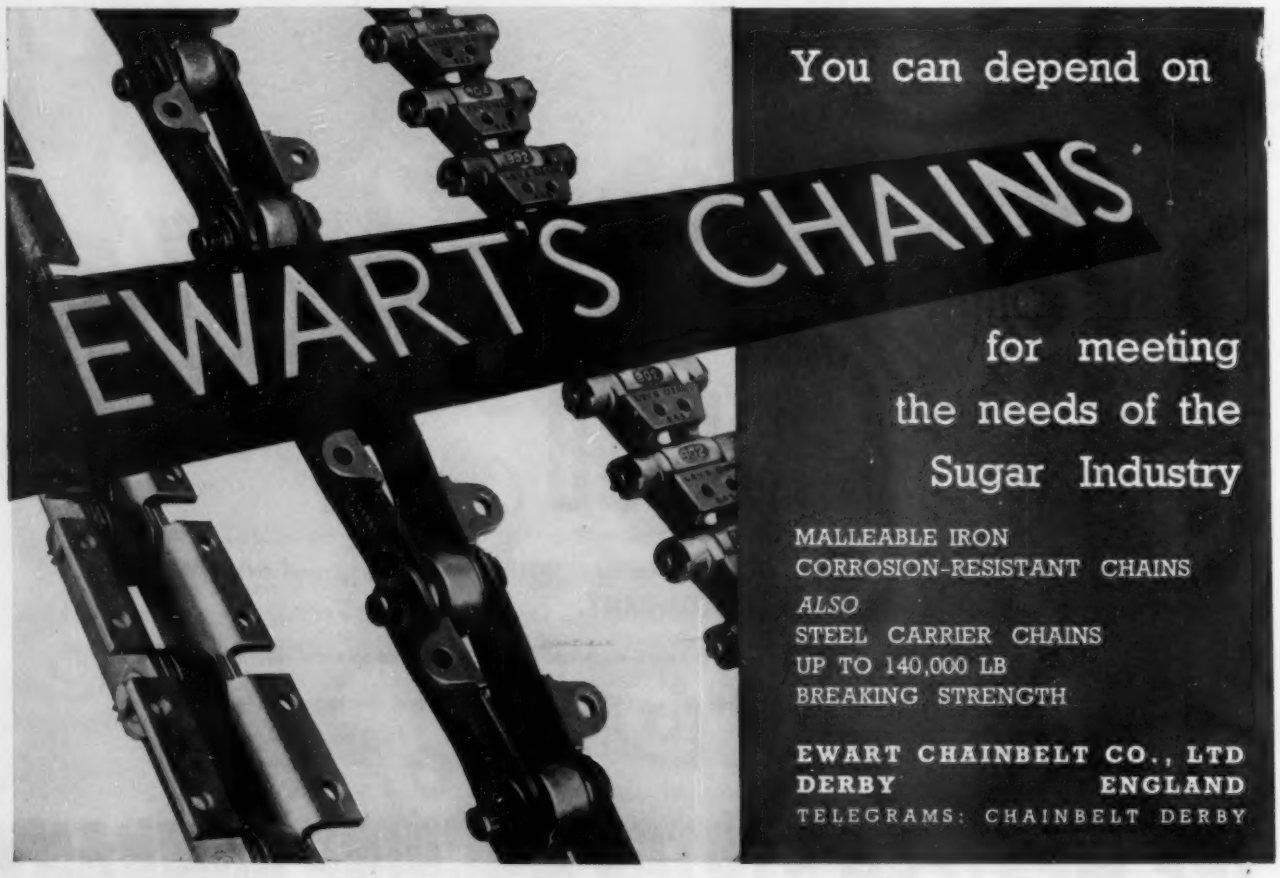
Discussing this in more detail under "Commodity Proposals," the report has this to say on sugar:

Domestic Measures—A target price will be proposed each year by the Commission and will be deemed to have been adopted unless the Council of Ministers (consisting of one representative from each Member State) agrees unanimously within a specified time-limit, to set it at a different level. Member States may, if they consider it advantageous, fix price for sugar beet, in accordance with customary contracts, based on the target price for sugar adjusted for processing costs.

In order to maintain market prices at around the target level, the European Sugar Office will be authorized to purchase home-produced sugar at a price set below the target price by a margin to be determined. If the volume of production exceeds domestic requirements, however, any losses incurred on export sales, or on alternative disposals, will be borne jointly by factories and beet producers. Consequently, the target price may be limited to the quantity consumed domestically, the surplus realizing only the world market price. If this disincentive does not prove adequate to curb surplus production, it may be necessary to incorporate a system of production quotas.

External Trade—To counteract the influence of lower world prices, imports of sugar (and derived products) from non-member countries will be subject to variable import levies. Further protection will be afforded by provision for import licences. Such licences will be issued in the quantities applied for unless the Commission

(*Continued on page* 10)



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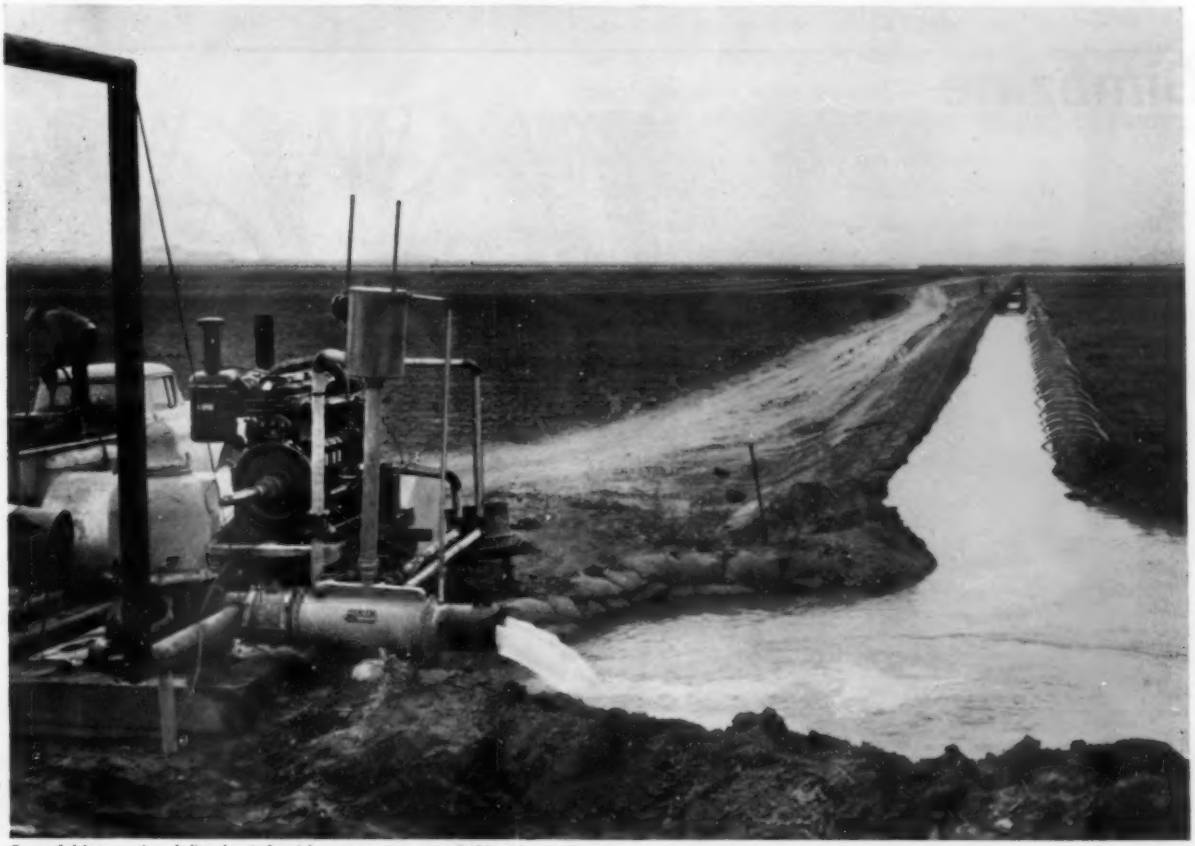

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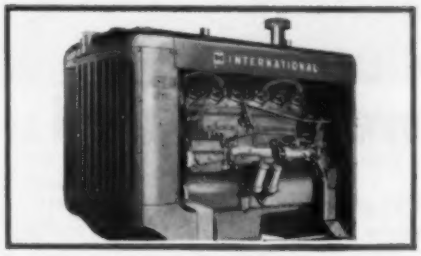

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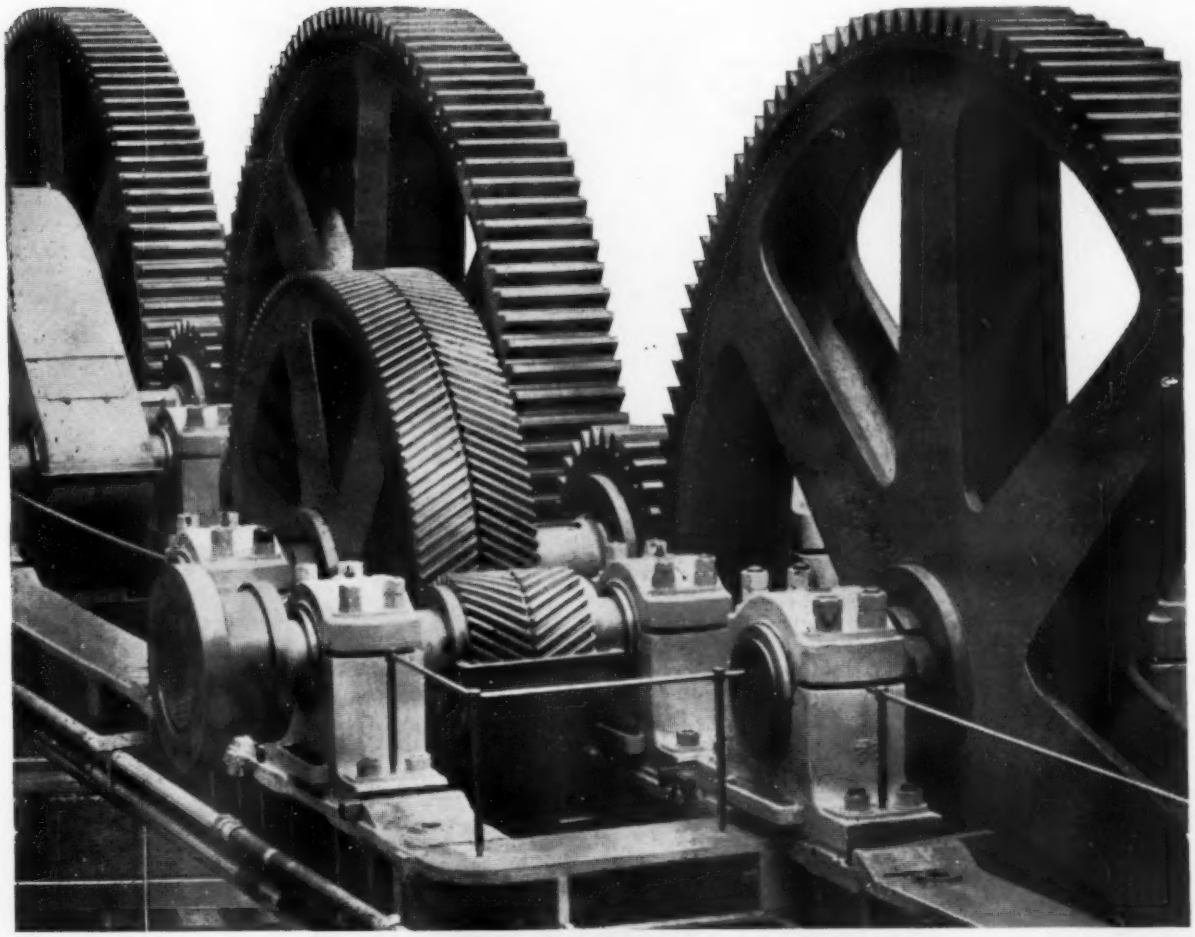

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European News

(*Continued from page* 6)

decides at any time that the volume of imports is jeopardizing the interests of domestic producers. If, for example, the condition of the market were such that the European Sugar Office was obliged, in order to support the market, to purchase substantial quantities of home-produced sugar, the issue of import licences would be suspended until the situation had improved.

The regulations applicable to exports of sugar (and derived products) provide that imported sugar and processed products intended for re-export will be allowed duty-free entry on a temporary basis. Exporters of goods manufactured from imported sugar will be able to claim a refund equivalent to the levy paid on the imported sugar and any fiscal charges imposed within the Community. Furthermore, in order to avoid discrimination against goods manufactured from domestically-produced sugar, exporters of such products will be able to claim the same concessions as those allowed on goods manufactured from imported sugar. Exporters of sugar products will therefore be on a par, so far as the cost of raw sugar is concerned, with manufacturers in countries using duty-free sugar purchased on world markets.

Funds—In order to finance the measures described above, a European Sugar Fund will be established. This will draw its resources, in the first place, from the levies on imports; additional monies may be made available through authorized transfer from other Funds and, if necessary, from levies on sugar producers.

Discussing the outlook, the report of the National Farmers Union of England and Wales says that sugar production in the Community is more than sufficient to meet domestic requirements. In most Member States the tendency in recent years towards over-supply has been kept in check by output restrictions: production in Western Germany has, however, expanded markedly as a result of progressive increases in the area under cultivation.

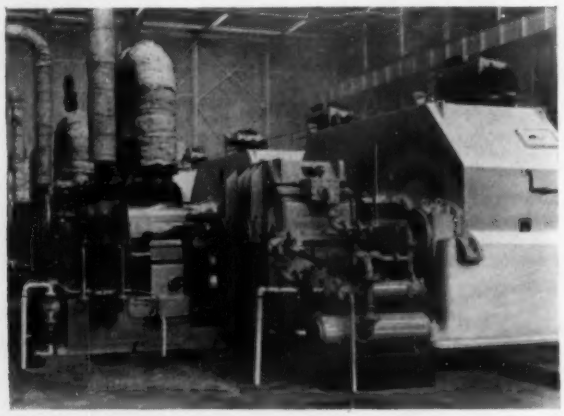
The Commission recognizes the importance of sugar beet in the agricultural economies of Member States, and the value of the crop being enhanced by its additional use as a source of animal feed and by its contribution to a properly balanced crop rotation. Nevertheless, in view of the heavy losses that would be likely to be incurred on the export of surplus output, it is considered essential that output should be restricted as closely as possible to domestic requirements. Under the common policy any losses on export sales or on alternative means of surplus disposal are to be borne jointly by beet producers and factories. Exports of sugar products incorporating home-produced sugar would also involve the industry in losses since provision is made for refunds to manufacturers to enable them to purchase domestic sugar at world market prices.

The trend of producer prices in member countries in recent years and the initial adjustments proposed by the Commission in wholesale prices for sugar of the 1962 crop are shown in the accompanying table.

It is expected that the price adjustments, in conjunction with the progressive reduction in trade barriers within the Community, will promote exports from the surplus member countries to Western Germany. Under the current International Sugar Agreement, trade between the Community countries is limited to net exports of 150,000 metric tons; the Commission is, however, seeking to secure an amendment which would allow intra-Community transactions to be treated as internal trade and hence not subject to quota restrictions. Exports by the Community on the "free" world market would continue to be limited to prescribed quotas.

Summing up, the Commission recognize that a continued upward trend in production of certain commodities would give rise to serious problems of surplus disposal. They propose, therefore, through their price and marketing policy to discourage output of those commodities—notably sugar, wheat and dairy products—for which production

(*Continued on page* 44)



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One of a number of Brotherhood Steam Turbines installed in a Swaziland sugar factory.
A battery of 6—550 B.H.P. 31" Brotherhood Horizontal Single Stage Impulse Steam Turbines built to the order of George Fletcher & Co. Limited, Derby and shipped to South Africa.
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The illustration shows a modern 15 Roller 35" x 72" Sugar Cane Milling Plant with individual Turbine Drives recently supplied to Deep River Beau Champ Ltd., Mauritius. The average grinding capacity figure for the 1958 crop was 103 tons canes per hour. Extraction 96.2%. Cane fibre content 12.5%.

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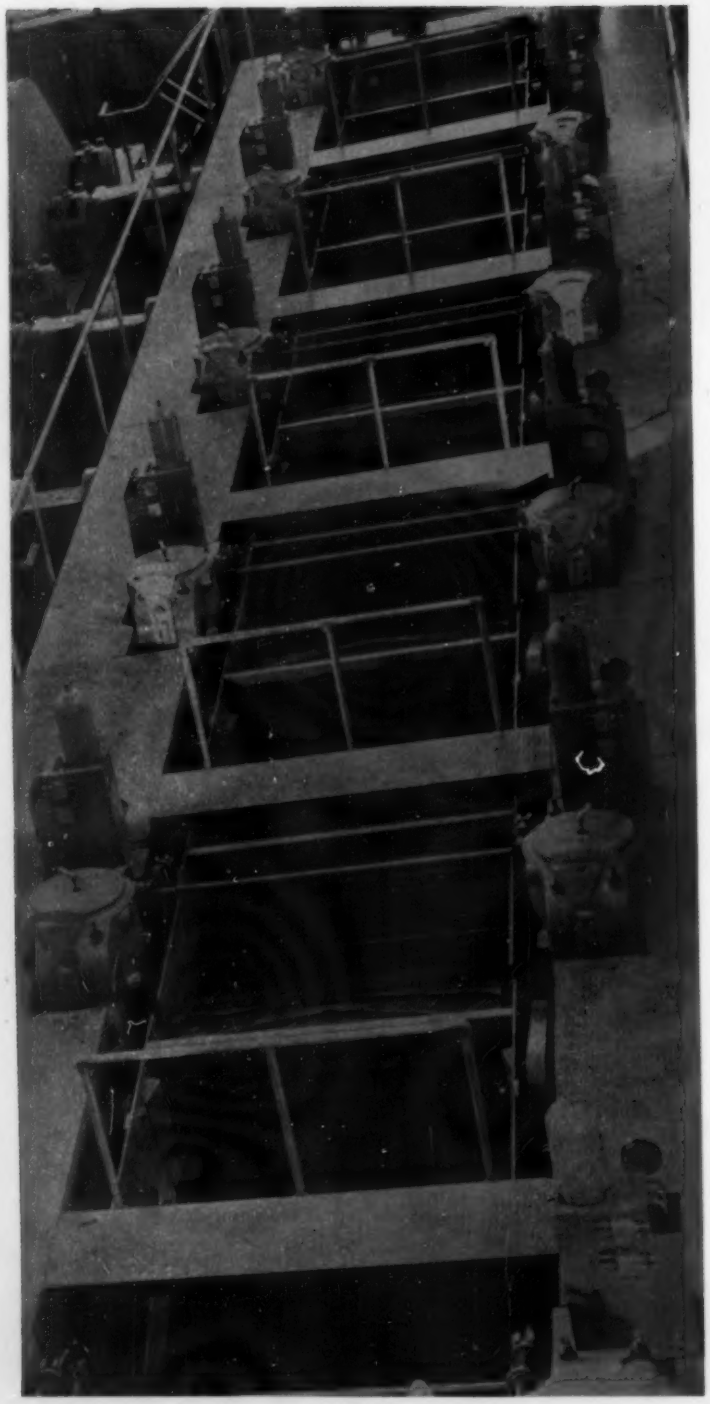

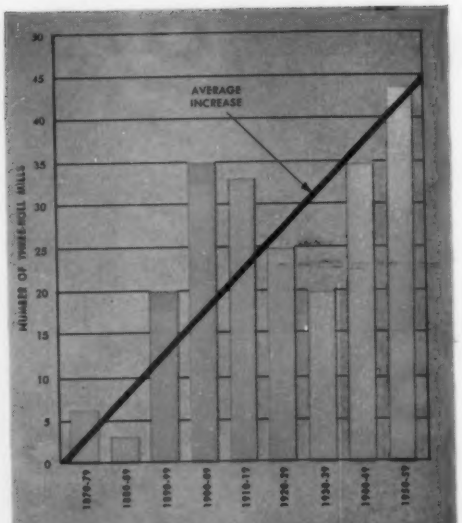

Chart showing number of Farrel 3-roll mills built in each decade since 1870.

Because, in recent years Farrel has pioneered a number of major refinements in sugar-grinding equipment.

For example, improvements in hydraulic ram mechanisms to maintain uniform roll pressure, and the introduction of force-feed rollers have resulted in increased sucrose extraction. Automatic lubrication of roll journals and centralized drive control for individual mills reduce costs for operating personnel.

New designs for side and top caps have been developed to permit fast, vertical removal of all rolls for regrooving and other maintenance. Time required for removal of hydraulic pistons and intermediate carriers has also been reduced.

Stronger housings and safeguards against corrosion add years to the life expectancy of mills. New hardened crownwheels, fabricated gears and rubber-belt carriers are establishing records for durability.

These are only a few of the recent innovations that have led to the increased demand for Farrel mills. For the full story, send for a copy of bulletin 312.

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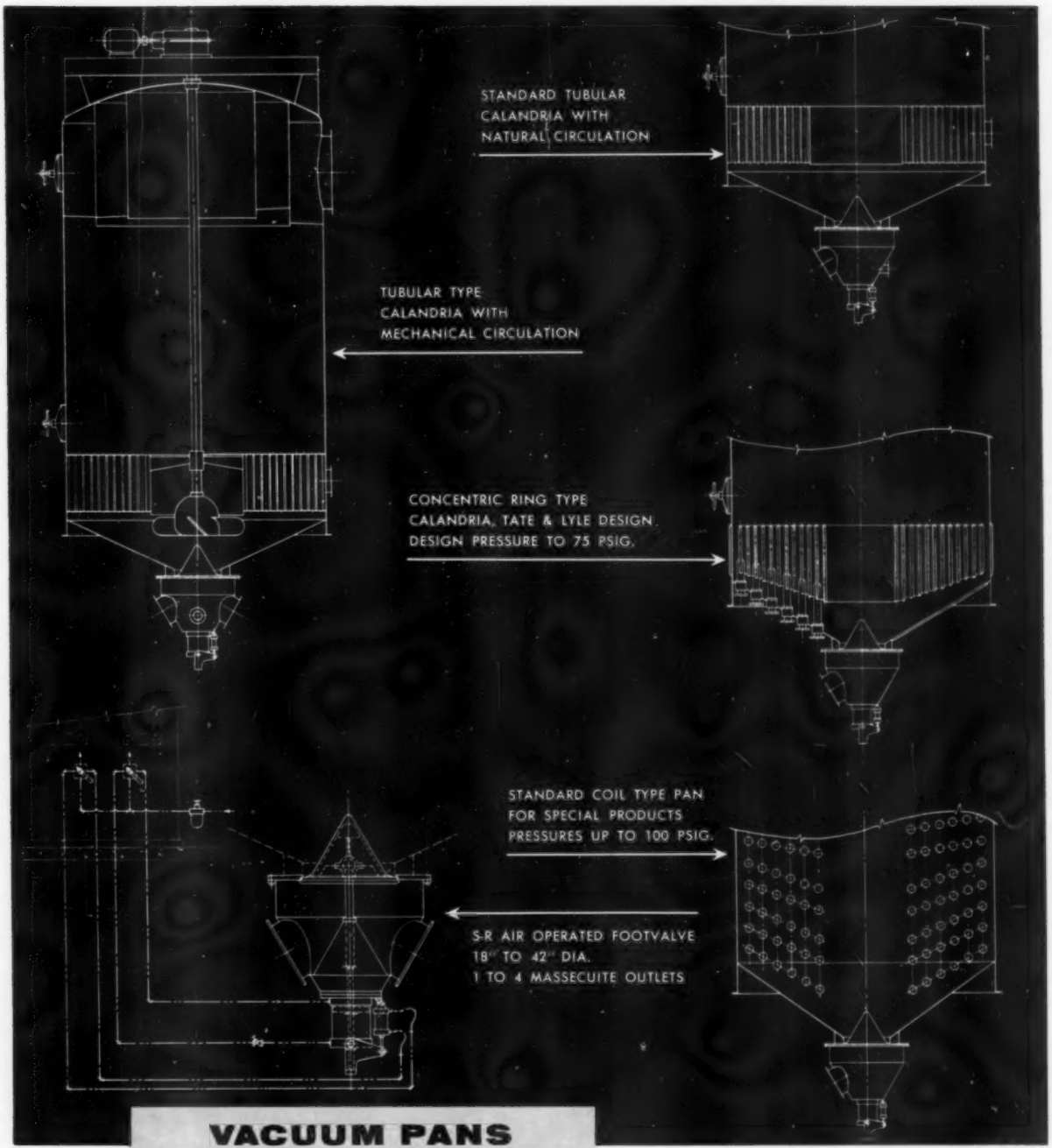

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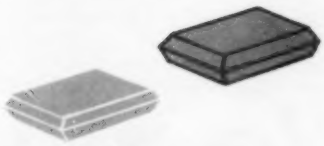

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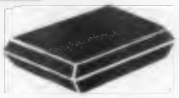


Field Mechanization Section

Most sugar men will agree that the century-old rail tramline system of transport and mill yard storage is the most efficient type of cane handling that has ever been devised. However, the lower cost of road transport, and its greater flexibility, offers an opportunity for an even more efficient system. But, in many cases truck transportation has not been fully successful because the basic principles learned in the rail system were forgotten.

Recently, Hilo Trailers, Ltd., proposed a "containerization" concept of road transport, which applies all the principles of tram operation with the semi-trailer (15 to 20 tons) considered as a container for cane.

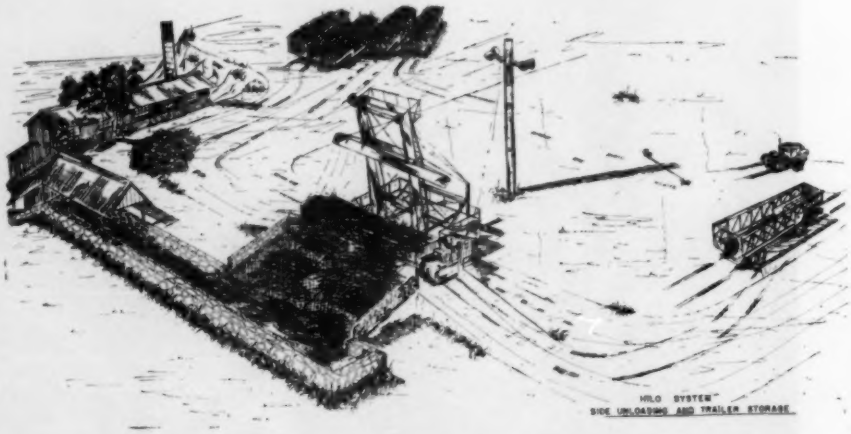
In the rail operation, the cane car is a container—with wheels. For most efficient operation, the car is loaded in the harvest field by hand cutters or loading machines. The car provides rolling storage for cane, which is not transloaded or otherwise handled, until the car is dumped on the feeder table at the mill.

The cane car is not permanently attached to an engine. The engine merely couples-up when needed to provide pushing or pulling power.

When trucks were brought in to take advantage of the economy and flexibility of road transport an entirely new concept of operation was born. The cane body, or trailer, was considered as fixed to the engine, or power unit. This resulted in an expensive transport unit that had to be kept moving. Cane was frequently transloaded, and the truck could seldom be used for rolling storage. This resulted in the serious problems inherent to stockpiling cane in mill yards. Costly equipment was required to handle cane into and out of a stockpile, and the weight of the pile and rehandling caused heavy sucrose losses.

The containerization concept brings back the efficiency of the rail system. Semi-trailers are substituted for rail cars. The prime mover, or engine, is used only for pulling trailers and the trailers are uncoupled as soon as the destination is reached. And, trailers are used for rolling storage of cane.

To make this system work efficiently, it was necessary to develop a hydraulic landing gear which operates from the driver's seat and makes coupling and uncoupling as fast as connecting railroad cars. These hydraulic landing gears have been operating for more than a year on Hawaiian sugar plantations. Less than one minute is required to separate, and couple, the semi-trailer and power unit.



The accompanying sketch shows the containerization concept in the mill yard area. Full trailers are brought into the mill yard by the highway-type truck tractor, and uncoupled. The semi-trailers serve as rolling storage. Cane is kept in the trailers until needed by the mill. At that time, a small mill-yard mule tows the semi-trailer to the Hilo unloader and cane is discharged onto the feeder table. The empty trailer is serviced, and parked, ready to be picked up by the highway-type truck tractor to go to the harvest field.

Horsepower Classifications

In the last Field Mechanization Section article (May 1961) it was explained how "horsepower" originated, and the formula given for calculating this unit of measure. One horsepower, for example, is equal to 33,000 foot-pounds of work in one minute, or 550 foot-pounds of work in one second.

However, in dealing with internal combustion engines, such as those used in automobiles, trucks and tractors, we are usually interested in three horsepower classifications so that we may determine and evaluate the characteristics of the machine. These are:

Indicated Horsepower—This is the actual power generated by the expansion of gases in the cylinders and received by the pistons.

Brake Horsepower—This is the power output from the engine which is available for useful work.

Friction Horsepower—This is the power that an engine consumes in operating itself at a given speed, without any load. It is made up of friction in the main and connection rod bearings, friction of the piston rings against the cylinder wall, etc.

The efficiency of any machine is the brake horsepower (output) divided by the indicated horsepower.

In a 100% efficient engine, brake horsepower and indicated horsepower would be the same. But, this condition never exists because of friction horsepower.

The average internal combustion engine has a mechanical efficiency of 75 to 90%.

Horsepower of any internal combustion engine can be calculated by knowing the number of cylinders, the bore, stroke and revolutions per minute. However, today there are indicators which measure the pressure in the cylinder during the piston cycle. This provides us with the "indicated horsepower."

To calculate brake horsepower, the engine is connected to a dynamometer. The simplest of these instruments is a form of brake.

Friction horsepower can be calculated by a formula, when indicated horsepower and brake horsepower is known.

A four-wheel drive, turbine-powered tractor is definitely a possibility says George H. Larson, agricultural engineer at Kansas State University. These are expected to come, first, in large sizes, then should be practical in smaller units, he says.

Rotary hoe improvements are being studied with a high-speed tillage equipment tester in the agricultural engineering department of the University of Minnesota. The device holds the hoe in place as soil is moved under it.

Allis-Chalmers has added several new items to their 1961 line. A new wheel tractor, the D15, replaces the former D14. It is available with three engine types—gasoline, diesel and LP-Gas. It carries a 3-plow rating.

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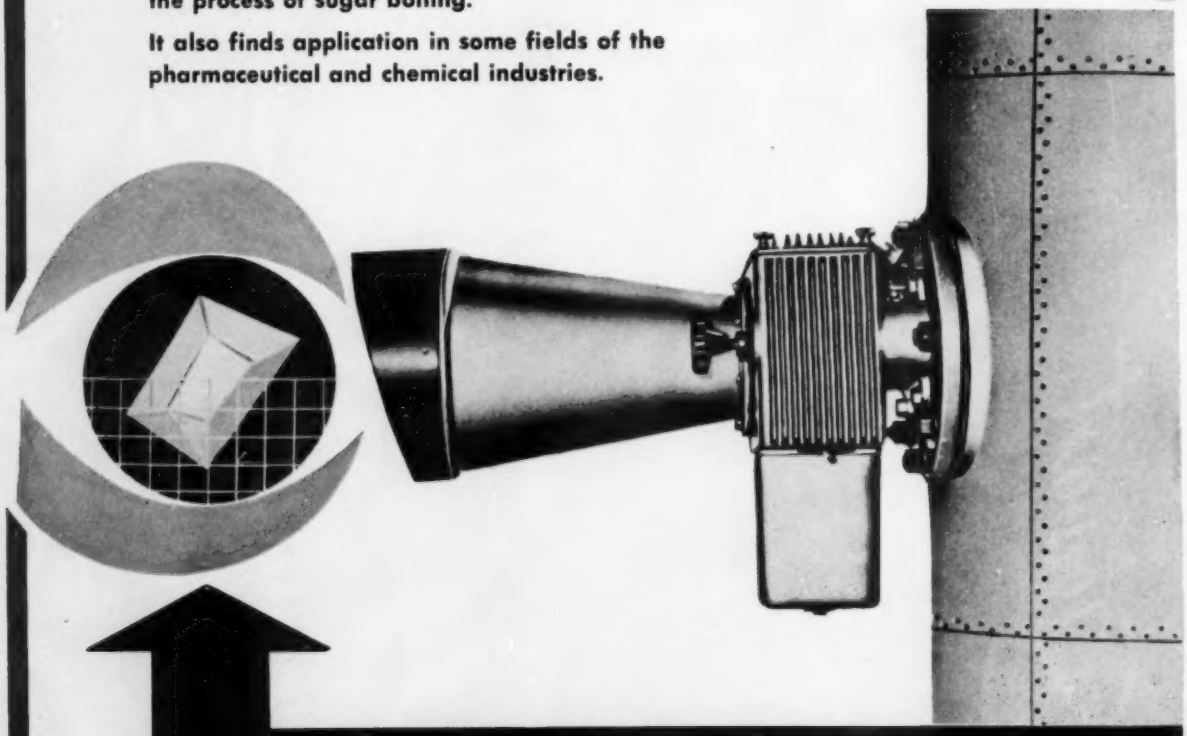

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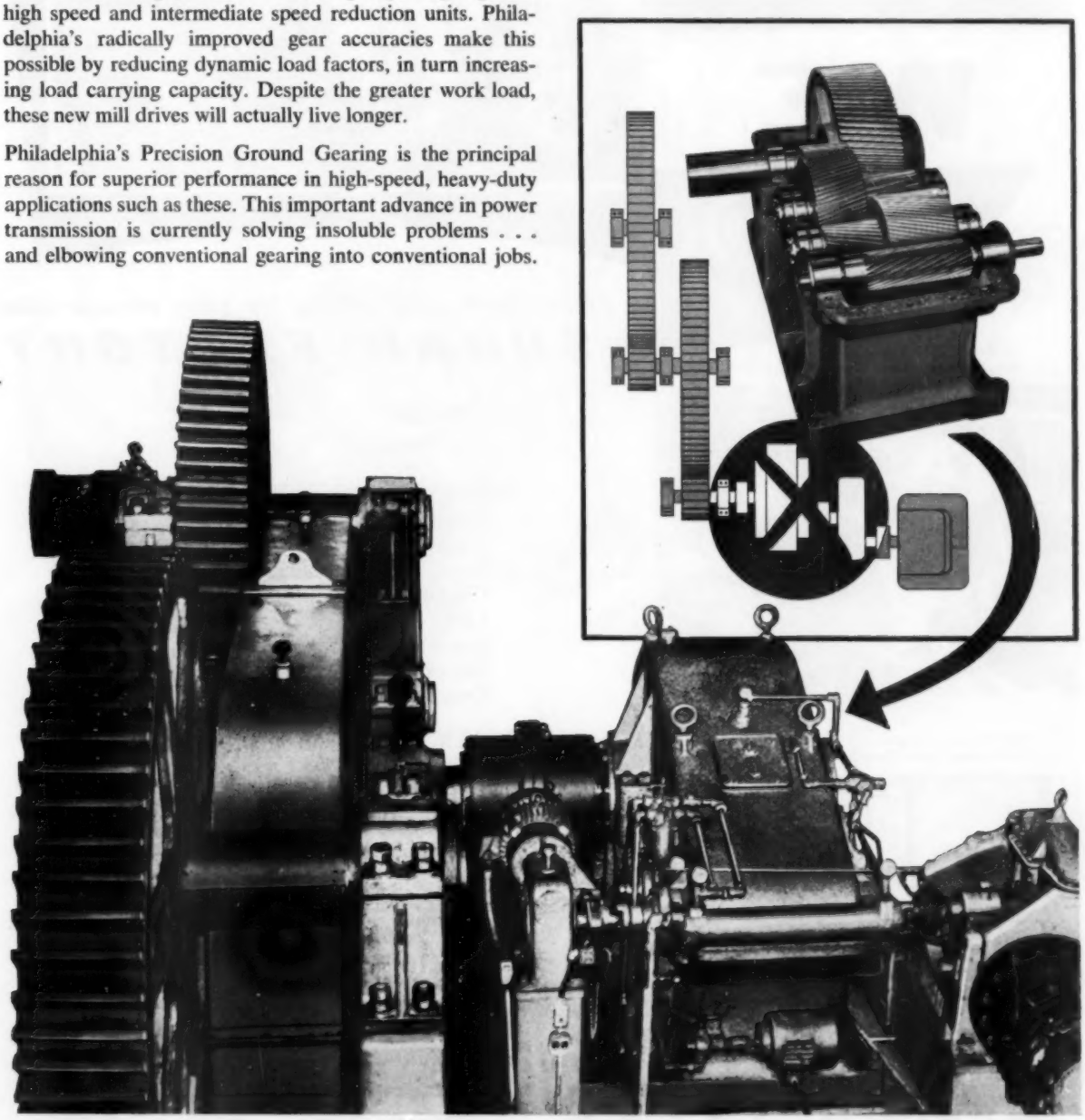

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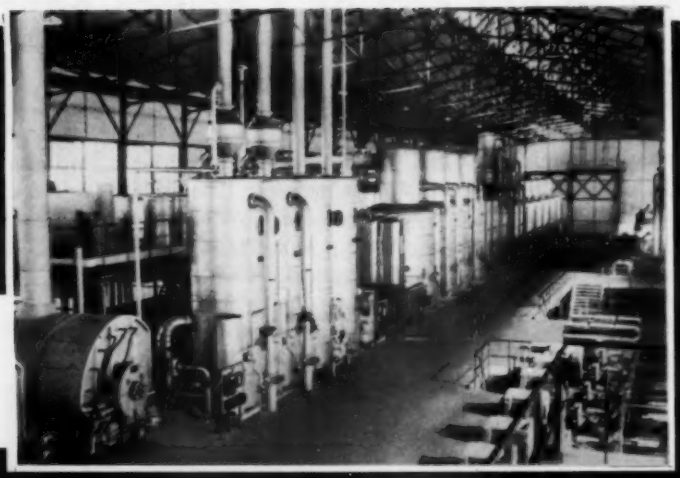

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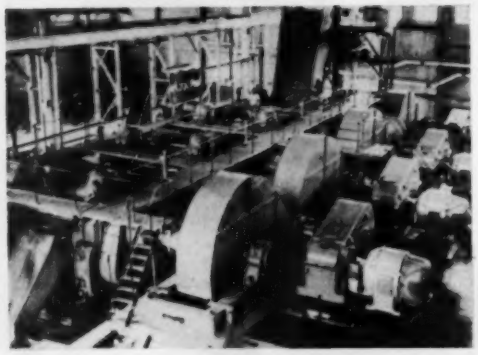

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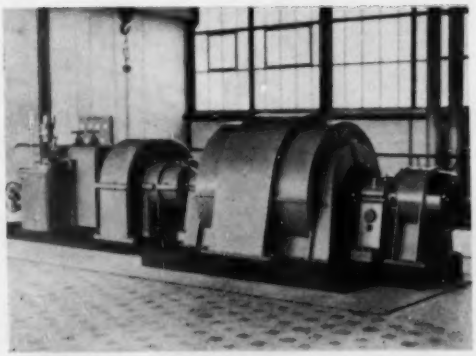

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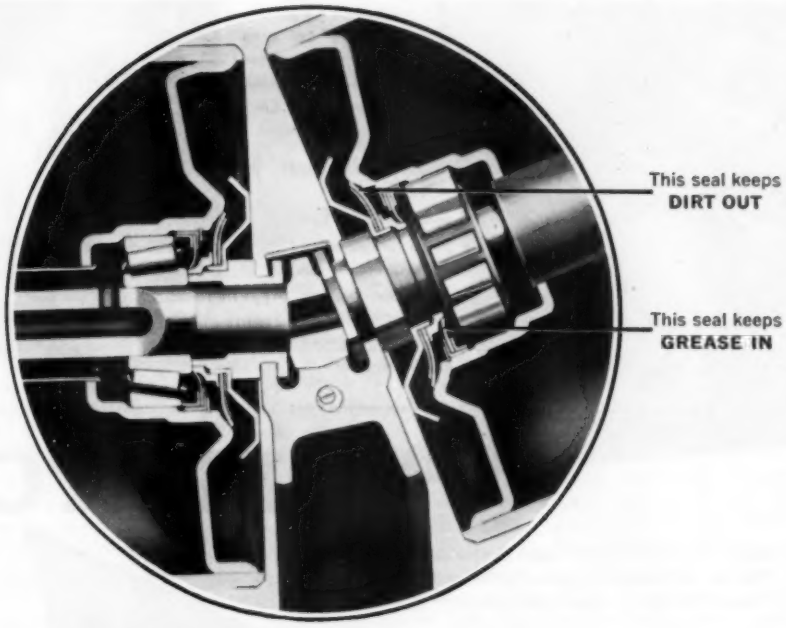

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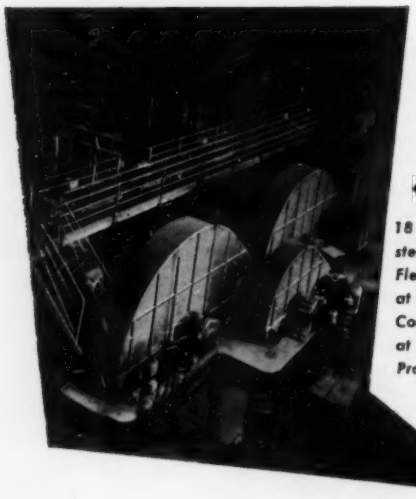
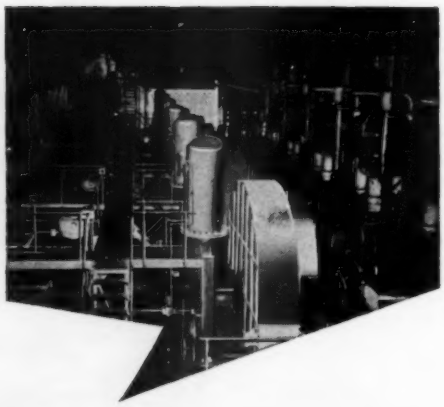


18 roller 34" x 66" steam turbine driven Fletcher mill tandem at Central Boca Chica, Dominican Republic.



18 roller 32" x 60" steam turbine driven Fletcher mill tandem at the Ganga Sugar Corporation's factory at Deoband, United Provinces, India.

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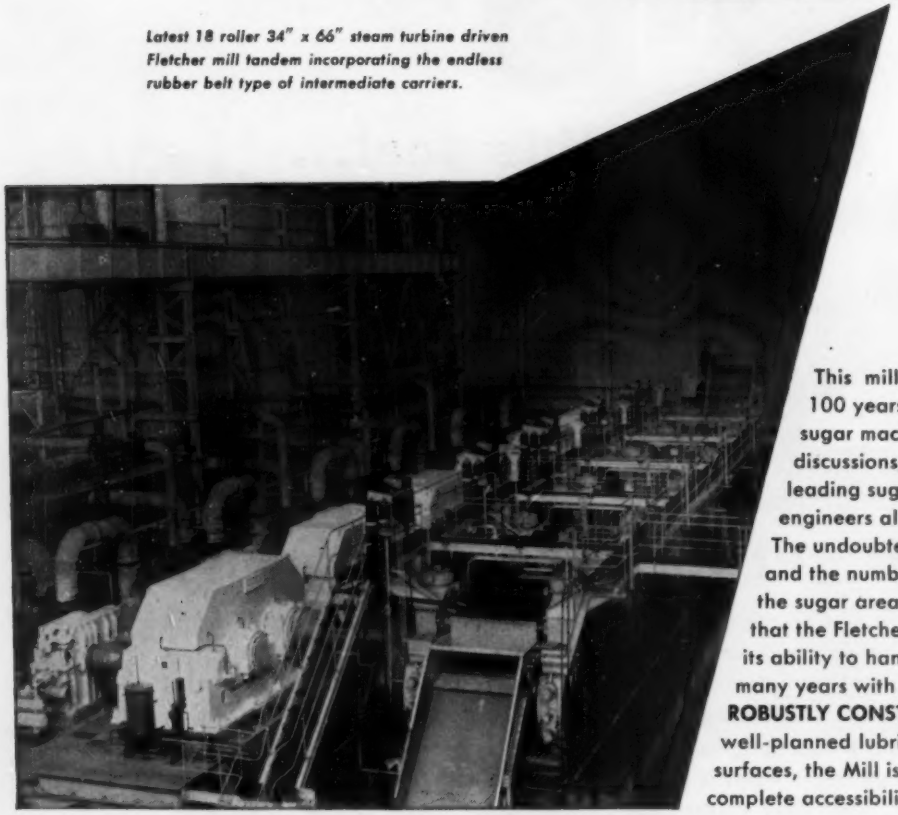

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Investigations Into Chlorotic Streak Disease

by

O. W. Sturgess

(Research Pathologist, Bureau of Sugar Experiment Stations, Queensland)

During 1958, Bird *et alia*[1] in Puerto Rico, Sturgess[2] and Egan (in press) in Queensland, working independently, established that chlorotic streak disease of sugar cane could be transmitted from diseased to healthy plants by growing them either, together in nutrient solutions or, separately without direct root contact but with common nutrient solutions. Recently, further work in Brisbane has added to the knowledge of the disease with regard to transmission by mechanical inoculation and per medium of the soil, the behaviour of the causal agent in the soil, the approximate size of the causal agent, its transmission to an alternative host and the effect of temperatures on disease development and foliar expression.

Extracts of diseased cane plants were prepared by the maceration of streaked leaves, the pressure extraction of stalk juices or the mincing of root systems taken from solution cultures. Inoculations were made into the roots of healthy plants either directly by means of a fine hypodermic needle or by immersion of the intact root system for seven days in the extract diluted 1 in 20 with nutrient solution. Inoculated plants were transferred to individual gravel-nutrient solution cultures and maintained in the glasshouse with an adequate number of plants treated with extracts from healthy plants. Transmission of chlorotic streak was obtained with each method of inoculation but only with the extract from diseased roots, indicating possibly that the roots could be the site of greatest concentration or even multiplication, of the causal agent.

Direct transmission per medium of the soil was obtained by planting alternate rows of healthy and diseased material in furrows within a glasshouse and filling in the furrows with soil collected in the field from the base of stools showing obvious symptoms of the disease. The glasshouse was flooded at intervals to produce the water-logging characteristic of fields where the disease occurs naturally. Over a period of almost two years, during which the cane was ratooned, 16% of the originally healthy stools showed symptoms. In June, 1960, i.e., in mid-winter, all stools were dug out and as much debris as possible removed by forking. After a lapse of 47 days, healthy setts of the variety N.Co.310 were planted and, after the primary shoots had come away, the ground was flooded every day except over the weekends. All shoots were ratooned 176 days after planting, by cutting all stalks at approximately six inches above ground level. A number of transmissions, approximately four percent of the stools have already occurred. It is apparent that chlorotic streak may be carried over in the soil from one planting to the next in the absence of any host plants.

Other soil experiments have revealed an interesting aspect regarding the transmissibility of chlorotic streak per medium of soil water. Paired four gallon drums, one located above the other and connected by a plastic hose, constituted the experimental unit. Replicated treatments of six paired combinations of sterilized or unsterilized soil from the base of diseased stools and healthy or diseased setts were arranged in drums. Transmission results have shown that unsterilized soil has an adverse effect on disease transmissibility through soil leachates. Leachates from diseased plants growing in either sterilized or unsterilized soil proved to be infectious only when they entered sterilized soil. The evidence supports the concept that there exists in soils a "virus infection inhibiting power"[3] and that this power is reduced by soil sterilization.

The percentage of transmission with diluted root extract was sufficiently high to warrant the application of the root inoculation technique in determining the approximate size of the causal agent. Extracts were accordingly filtered in series through sintered glass and standard bacteriological filter discs. Filtrates were diluted 1 in 20 with nutrient solution and roots of the test plants immersed for up to eight days. Transmission was obtained with all filtrates down to the finest used—a pad (Ekwip D9) with an initial retention of all particles of less than 0.5 micron. It would appear from this that the causal agent is a virus.

Elephant grass, *Pennisetum purpureum* Schum., has been reported as a probable alternative host for chlorotic streak disease in Hawaii, Puerto Rico and Australia largely on the basis of the resemblance of certain streaks in it to those due to the disease in cane, although in Puerto Rico, treatment of planting material in water at 52°C. for 20 minutes, which is curative for the disease in cane, also rendered the grass free from the disease. Gravel cultures were arranged to include (a) elephant grass seedlings in the same trough as diseased cane shoots, (b) elephant grass plants (originally from streaked material at Mossman, North Queensland) showing streaks in the same trough as healthy cane shoots and (c) elephant grass seedlings and healthy cane shoots. Transmissions occurred in treatments (a) and (b) thus demonstrating that the disease in the elephant grass was chlorotic streak and that it could be transmitted both from the grass to cane and vice versa.

Studies on chlorotic streak disease in Queensland and elsewhere have been made difficult by the wide variations in symptom expression under varying climatic conditions. During the greater part of the year the erratic behaviour of diseased plants growing in subtropical glasshouses made difficult the interpretation of experimental results. In the belief that temperatures might play an important part in this, experiments were set up in aerated nutrient solution cultures maintained at definite root temperatures. Results indicate that foliar expression is dependant on temperature and that the optimum temperature lies within a narrow range approximating 25° to 30°C. Below 25°C. the plant reaction becomes erratic and unreliable in that a large proportion of plants arising from diseased setts will either show no leaf symptoms or symptoms for only brief periods. Recent evidence from a current experiment indicates that the level of the fluctuating air temperatures affecting other parts of diseased plants are also of importance.

The results of these recent studies with chlorotic streak disease provide an explanation of the erratic behaviour of the disease in the field and an understanding of the complexity of the mechanism underlying infection and spread. It is postulated on the above evidence and field observations of the disease that the following factors are interrelated with regard to plant infection:—

(i) concentration of virus particles released from the root systems of diseased plants and present in the soil;

(ii) association of free soil water with the root systems of healthy plants;

(iii) soil temperatures; and

(iv) "virus infection inhibiting power" of the soil.

References

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[2] Sturgess, O. W. (1960)—Studies with chlorotic streak disease of sugar cane. I. Introductory nutrient solution studies. *Bur. Sug. Exp. Stas. Qd, Tech. Commun.* No. 3, pp. 15-9.

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Reestablishing the sugar industry in Morocco but this time using sugar beets as the basic raw material. Picture shows land being cleared in the Gharb region prior to planting sugar beets.

Reestablishing A 16th Century Industry

Sugar Beets In Morocco

by
M. R. Bull

SUGAR cane had been grown in the East for many centuries before it was brought to the Mediterranean area by the Arabs in the 9th century. Sugar beet was grown much later. Because of propitious conditions sugar cane grew satisfactorily in both Spain and Morocco.

In fact from the 10th to the 16th century Morocco grew so much that she was able to export a considerable amount. The Court of Queen Elizabeth I of England enjoyed Moroccan sugar and it was exported to Italy for its weight in Carrara marble. Today the beautiful Saadien Tombs which the Sultans built in Marrakesh with this marble, are still admired by visitors.

Cane was grown in the Souss valley south of the High Atlas, where conditions of irrigation and climate were propitious. Recent excavations have brought to light the ruins of aquaducts, earthenware tanks and thousands of broken pottery moulds of the same size and shape as those used today in the modern refinery at Casablanca to make sugar loaves of 2 kgs each. Wars and invasions destroyed this industry until cane ceased to be grown in Morocco and sugar had to be imported.

Until the middle of last century sugar consumption was not high. But with the ever growing popularity of very sweet mint tea, which has become Morocco's national drink, consumption of sugar has so increased that today Morocco is one of the greatest consumers—about 30 to 35 kgs per person per year. Morocco needs yearly about 350,000 tons of sugar and as the population increases, this total will increase.

Up till now all sugar has been imported. Until recently Morocco received U. S. help through ICA importing sugar from Cuba. In 1958, 240,000 tons were refined in Morocco from cane sugar imported from Cuba, the West Indies and Peru. Of this 10,183 tons were re-exported. The most popular form of sugar sold locally is the two kilogram loaf of which about 280,000 are sold annually. Powder sugar, 36,000 tons, is consumed by the poorer regions, it being cheaper (at present 95 M. frs per kg). Finally some 7000 tons of lump sugar are consumed by Europeans and foreign visitors.

In 1956 a Belgian Dutch company became interested in fomenting a revival of the sugar industry. With the participation

A typical Moorish cafe in the Kasbah at Agadir. The sweet mint tea and strong coffee account for a large consumption of sugar.

of the Moroccan State a company, the SOMASUC, was formed to study the possibilities of sugar beet and cane growing and the setting up of factories.

COSUMA, the large refinery at Casablanca, employs some 3000 people. It refines 900 tons per day of coarse sugar of different origins. Covering some 110,000 square metres, this refinery has up to date machinery and its own model township for its employees nearby.

Because of the scarcity of foreign currency, Morocco wants to produce as much sugar as possible. Experiments in growing cane and beet began as long ago as 1928 but it is only since 1957 that these experiments have developed satisfactorily. Because of the difficulties of irrigation as well as the fact that cane only gives employment for a small part of the year and Morocco's unemployment is high, efforts are being concentrated on beet growing. Several regions in the north and centre are propitious and beet has been grown successfully in these places. Sugar content is also considered good—running about 19 to 20%.

Today the Gharb region, a fertile plain near the sea, north of Rabat, grows about 20 tons of beet roots per hectare. Near Meknes the yield is only about 12-15 tons. Because of the rainfall, some 600mm, dry growning of beet can be undertaken with a winter sowing. Beet growing cost, last year, ranged from 120,000 francs dry to 130,000 francs irrigated and produced respectively 23 to 28 tons of cleaned roots.

According to the latest information, the yield per hectare has increased each year from 15 tons with 20% sugar content to 43 tons with 17 to 19% for the 1959-60 crop. In another region it was rather higher. To avoid harvesting during the hot summer season, planting must be early. In the Gharb sowing was from October to February with good results. In another region nearer the Middle Atlas where it is possible to irrigate, Spring sowing has been possible.

The Moroccan Government in conjunction with the SOMASUC company are trying to establish a beet factory in the Gharb with a daily capacity of 1500 tons of beet spread over 100 days, which would absorb 150,000 tons of beet grown on 5000 hectares of land. They hope that in the next ten years beet will be grown on some 80,000 hectares of land producing 100,000 tons of sugar. In conjunction with the other regions, it is hoped that in twenty years' time, Morocco will be able to produce enough sugar to meet its own needs.

In 1958 Morocco adhered to the International Sugar Agreement and in November 1959 the International Sugar Conference was held in Tangier. In Casablanca an association has just been formed grouping importers of refined as well as some importers of unrefined sugar. Gradually the sugar industry is becoming organized and productive.

Very sweet tea is drunk by rich and poor alike all over Morocco. Here tea is being served by a primitive Berber family in the High Atlas. Lumps are broken off a very hard loaf of sugar by tapping it with the bottom of a glass. Tea and sugar are flavored with a handful of mint leaves. The sugar is kept in the metal box by the boy's feet.

A corner of the Saadien Tombs at Marrakesh built of Carrara marble which was exchanged for Moroccan sugar in the 16th Century.

Spreckels To Build Beet Factory In California

The map at left shows the location, capacity and ownership of the ten existing beet factories in California and the site of the new Mendota plant (starred) being built by Spreckels Sugar Company in Fresno County. Upon completion in 1963 Mendota will represent over 11% of California's total beet slicing capacity.

A NEW beet sugar factory with a capacity to slice 4,000 tons of beets per day is being erected at Mendota in Fresno County, California at a cost of $16 million by the Spreckels Sugar Company. Production is estimated between 75,000 and 100,000 tons of sugar. A unique feature of the new plant is that it will handle only bulk granulated and liquid sugar for industrial users.

Mendota will be the first new beet sugar factory in the United States since completion of the Crookstown, Minn. factory built in 1954 by American Crystal (SUGAR, December 1954, pg. 33); it will be the first new beet factory to be built in California in 14 years. In view of the phenomenal growth in population of the state new productive capacity is definitely indicated.

Construction work on the new factory started in June and it is anticipated that Mendota will start slicing in the 1963 campaign. The plant is located on 2300 acres of land which provide space for the factory, subsidiary operations and an experimental farm. It will increase Spreckels' beet processing capacity by 27.5% and will produce over 1,000,000 lbs. of sugar per day.

Several innovations will be incorporated in the process, notably the new CAP (continuous adsorption process) similar to the process now in successful operation at Woodland as described in SUGAR Y AZUCAR, May 1961, pg. 33 and June 1961, pg. 54. Provision is being made for recycling of lime with resulting savings in the amount of this costly raw material. The factory will be equipped entirely with automatic centrifugals, only the second beet plant in the United States to use all automatic centrifugals; the only other plant so equipped is the Spreckels factory near Salinas.

A radically new concept of storing and moving beets into the factory, designed by the company engineering staff, will be incorporated.

In addition to a daily output of over 1,000,000 tons of bulk granulated and liquid sugar. the factory will produce between 40,000 and 50,000 tons of molasses dried beet pulp, a high quality beef and dairy feed.

Operation of the new beet factory will improve the economic position of the surrounding territory substantially. Payroll of the 250 to 300 workers is expected to be around $1,500,000. The factory will purchase between 600,000 and 800,000 tons of beets and will require 10 million cubic feet of gas or 1,500 barrels of fuel oil per day depending on the fuel used.

World's Largest Yeast Plant

Protein From Sugar On Taiwan

By Wan-chun Hsu

Taiwan Sugar Corporation

Cane grower discusses agricultural problems with plantation manager on Taiwan. This is one of the small growers whose cane crop is sold to the Taiwan Sugar Corporation for the manufacture of 900,000 tons of sugar annually. Now, an important by-product of this cane will be yeast to improve the protein content of the Taiwan diet.

Yeast Composition: There are many kinds of yeasts existing in the great natural environment. Some yeasts may produce cells while some do not. Therefore, the composition of yeasts may not necessarily be the same. The most important factor which affects the yeast composition is the environment in which it grows. In case, during the propagation procedure, ample supply of ammonia is available, the fat produced would be as little as two percent, while on the other hand, if very little ammonia is supplied, as much as 60% dry basis of fat will be produced. Hence, the yeast composition obtained from analysis does not represent the general yeast composition. Furthermore, the different analysis methods employed would show different compositions. The following are two typical examples of yeast composition:

(1) *Beer yeast*	
Protein	46.74%
Fat	1.61%
Carbon hydrate	35.37%
Ash	7.87%
Fiber	8.41%
(2) *Torula yeast*	
Water	5.85%
Ash	9.07%
Phosphorus	1.92%
Calcium	0.85%
Protein	47.43%
Fat	1.01-4.84% (depending on method used)
Fiber	0.82%
Thiamin	5.3 γ/gm.
Riboflavin	45.0 γ/gm.
Pyridoxine -HC_1	33.4 γ/gm.
Pantothenic acid	37.2 γ/gm.
Biotin	2.3 γ/gm.
Niacin	417.3 γ/gm.
Folic acid	21.5 γ/gm.

Yeast may be used as protein: The protein content in yeast is probably the highest among essential foods. Analysis shows that the protein content in yeast exceeds the protein content of soy bean by 21.4%, peanut by 44.8%, milk powder by 44.8%, dried beef by 35.8%, egg by 71.3%, ham by 65.1% and fish by 44.9%. For this reason the protein content in yeast has received much attention from world food authorities. However, the high protein content alone is still not sufficient to justify the food value of yeast. A further step must be taken to determine the quantity of amino acids which the yeast contains and how they are distributed before the food value can be evaluated. The accompanying table shows such analysis.

Amino Acids	*Beer Yeast Percent*	*Torula Yeast Percent*
Arginine	3.1	3.61
Histidine	3.3	1.31
Leucine	7.3	4.14
Lysins	7.1	—
Isoleucine	6.0	3.75
Threonine	5.5	2.58
Tryptophan	1.2	0.66
Methionine	2.7	0.84
Phenylalanine	4.5	2.41
Valine	5.3	2.89
Cystine	1.1	0.68
Tyrosine	3.8	—
Glycine	—	0.22
Glutamic acid	—	6.90

The first ten items are the essential amino acids which are necessary for the proper growth of the human body. In other words, protein which contains these ten amino acids is called full protein, a valuable food to human beings. It is evident that the beer yeast is one kind of full protein. Besides, yeast contains a kind of polypeptide called glutathione. If the amount is 0.2% on dry basis, it is a detoxifying agent and very useful.

The food value of protein in yeast has been proved by many food experts. Experiments show that in case no methionine protein is added to yeast feed, the growing rate of rats is only 60% that of casein. This results from the methionine deficiency in yeast protein. If methionine is added to yeast protein in the amount corresponding to casein, the food value would be just as good as pure casein. Therefore, attention must be paid when using yeast as food.

Besides, yeast may be used for manufacturing artificial meat or meat juice. The flavor and taste are just the same as real meat. The process is as follows: After

the plasmolyzation of fresh yeast and salt solution, stir at 37 deg. C. for a few hours. Then dry it under high temperature and high speed. The final product will have meat flavor and contain high amino acids which may be easily digested and absorbed. If the yeast is dissolved in casein, it becomes a nutritious diet for invalids.

Yeast may be used as edible fat: It has been pointed out that if the ammonia is reduced and sugar content increased during the propagation process, the fat content in yeast may be increased as much as 60%, while protein is decreased. It also has been pointed out that the most economical fat content would be 40%, because it would take a much longer period for the yeast to be fattened. Evidently, it would not meet the industrial economic requirement. Yeast combined with fat is brown in color, but with good taste. Such fat contains arnchidonic, eleostearic and lichenic acids. The common saccharomys yeast fat does not taste as good but is still suitable for eating. The composition is as follows:

Elements	*Composition %*
Glycerol	5.3
Volatile acids	5.2
Palmitic acids	9.5
Stearic acid	5.9
Oleic acid	47.6
Linolic acid	2.9
Sterols	3.3
Others	16.6

Yeast may be used as food additives: Yeast itself is not only a nutrient food but also may be used as a food additive because of its special physical and chemical properties. Since yeast is a high anti-oxidizing agent, it may be used as a food preserving agent, for example in cream. In this way, the food quality may be improved.

Also yeast powder possesses an emulsifying characteristic. If it is mixed with dried soup powder, it will help to emulsify the powder and water. Hence, the soup will taste better. If yeast powder is added to bread or cakes, there is a tendency to preserve water content and prolong freshness. Should yeast be added to crackers, it will improve fragrance and add brittleness.

Yeast may be used as the source of vitamin B: The ample content of vitamin B in yeast is evident, and has already been shown in the accompanying table. Specifically the niacin and riboflavin content are the highest. Vitamin B in yeast is the highest among all foods. Therefore, the valuable vitamin B may be obtained from yeast at a lower cost. Bread should be added to yeast so as to improve nutrition.

Yeast may be used as source of vitamin D: Yeast contains many kinds of sterols, among which, ergosterol alone comprises 0.56% dry basis. Such ergosterol if exposed to the violet rays, will convert into vitamin D, which is an essential food element for our body. If we take 10 grams of yeast daily, it will provide 5 grams of protein, 4 grams of carbohydrates, 360 garma of vitamin B_1 (thiamin), 590 garma of B_2 (riboflavin), 5310 garma of vitamin B_5 (nicotinic acid) and 110 garma of folic acid. Therefore, the use of yeast in our daily diet has a great future. Probably some day yeast will be as common as the soy bean curd used in our daily diet for thousands of years.

Modern cane agricultural methods, exemplified by the new American tractor illustrated en route to the cane fields, contributes to the efficient production of sugar molasses and yeast on Taiwan.

Manufacturing of Yeast on Taiwan: Since the uses and food values of yeast are numerous and great, and one of the essential raw materials for yeast manufacturing is cane molasses, yeast production has been pending for many years in Taiwan. As a matter of fact, Taiwan has been overpopulated ever since the Chinese government set up headquarters here in 1950. As Taiwan is also a protein-deficient island, much of the food must be imported from abroad. By the year 1951, there was a surplus production of alcohol distilled from molasses. The Taiwan Sugar Corporation decided, therefore, to develop yeast production so as to solve the protein and food problems. Several sugar factories of the corporation such as Hsingying, Taichung, Suantou and Chiaotou carried out yeast production on a small scale, while the Taiwan Sugar Experiment Station conducted most of the experiments. Steps in the process were as follows:

Yeast variety	Molasses
Tube culture	Raw material storage tank
Flask culture	Measuring tank
Flask culture	Settling tank
Culture tank No. 1	Clarified liquid
Culture tank No. 2	Purifying machine
Culture tank No. 3	Purified liquid storage tank
Seed yeast tank	Cooling device

↓

Fermentation tank
Separator
Washing tank
Filter press
Blending machine
Forming machine
Production storage

Molasses treatment: Molasses contains matter such as silicic acid, calcium sulphate, fat, fiber, etc., that interfere with the purification and further filtration processes, and restricts the yeast growth. Morever, they may affect the color of yeast produced. Therefore, they must be removed. The common method is by boiling the black-strap molasses with steam for one hour and letting it settle for 12-24 hours. The upper layer diluted with water is used for yeast manufacturing. The sediment usually amounts to 12-16% of the original volume.

For decoloring the molasses either calcium oxide or active carbon may be used. In the first case molasses must be boiled so that most of the impurities may be combined with calcium oxide for easier filtration. In the second, the active carbon has a higher decolorizing effect.

Yeast culture: Yeast culture on a small scale usually employs wort as an agent

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while on a large scale, low cost molasses is used. The density varies as the seed yeast and additives such as active carbon, and bagasse are used. The preparation of ammonium molasses is as follows:

Molasses	150 gm.
Calcium phosphate	1 gm.
Hydrogen ammonium phosphate	1 gm.
Urea	2 gm.
Concentric sulphuric acid	2 cc.
Well water to make	1 liter.

Dissolve molasses, calcium phosphate and sulphuric acid in water in that order and sterilize. After the mixture has cooled add sterilized urea and hydrogen ammonium phosphate. Adjust the pH value to 4.4.

Fermentation control: In the fermentation process, the sucrose content in the wort has much to do with the propagation of yeast. Usually it is in the range of 0.5-1.5%. In a continuous process, the sucrose content may be higher. The pH value is kept at 3.5-4.5. If the pH is too low it affects the color of the yeast.

Air supply to the wort is one of the most important factors in yeast manufacturing. The purpose of the air supply is that the oxygen in the air may quickly dissolve in the mixture all ingredients so as to encourage yeast propagation. From experience, one kilogram of yeast would require 10-12 cubic meters of air. Therefore, the amount of air required is tremendous. If the air supply is insufficient, yeast growth may be reduced.

During yeast propagation, a large amount of heat is produced. Each kilogram of yeast produces 4500 kilo-calories not including the heat generated by the agitators. The temperature in the yeast propagation process is kept at 30 deg. C.-33 deg. C., which is the most suitable for yeast growth. To control the temperature air is supplied at high volume and low pressure.

The construction of propagator is such that air, sucrose and all other ingredients are supplied at the bottom and the wort at the bottom is most suitable for yeast growth. When wort is agitated, it will rise to the top of the propagator. During the agitation oxygen, sucrose and other nutritious ingredients are absorbed by yeast, while carbon dioxide is increased. Evidently, the bottom layer of wort will not be so active for yeast growth and the agitator is required so as to increase swirling speed and propagate the yeast growth. In doing so, large size bubbles must be prevented by a modified agitator because large bubbles mean that air is not being fully utilized.

When the yeast cells reach a certain number the wort is separated, washed, filtered and blended. Then yeast is produced. However, the production scale in the past was rather limited.

A Modern Yeast Factory Erected: Under the U. S. aid program, the Taiwan Sugar Corporation initiated a modern yeast plant project in 1955. By January 1957, an up-to-date yeast factory was set up at Hsingying, Taiwan. Its daily production capacity is at 40 tons of yeast and 80 tons of feed. This probably is one of the biggest yeast plants in the world. At present the remaining yeast plants in various factories of the Taiwan Sugar Corporation either have been or will be merged into the Hsingying Yeast Factory in order to lower production costs and improve yeast quality.

The yeast manufacturing process at the Hsingying Yeast Factory may be briefly described as follows:

The raw materials currently used are cane black-strap molasses, urea, ammonium sulphate, superphosphate and, of course, ample volume of air and water.

The blackstrap molasses is measured, diluted to a definite Brix, sterilized through a continuous flash sterilizer and clarified through a high speed centrifugal molasses clarifier. Water is purified by passing through a series of sedimentation ponds, filter ponds and sterilizing tanks. The air is taken in from the outside of the building by high speed suction fans, compressed and passed through a series of cotton filter tanks.

The cane molasses and the other nutrient elements including urea, superphosphate and ammonium sulfate, air and water are fed continuously into six yeast propagators each 28 feet in diameter and 15 feet in height. Each yeast propagator is equipped with a specially designed agitator to control the foam and is driven by a 350 HP motor. The capacity of each propagator is eight tons of yeast on dry basis. The yeast wort, which contains about half a million to one million cells per cubic centimeter, is drawn continuously from the propagators.

The heat generated by the growth of the yeast in the propagators is removed by heat exchangers which are cooled by chilled water furnished by three refrigerating units producing a total of 1900 tons of refrigeration. The spent warm water from the heat exchangers goes to the refrigerating units which draw cooling water from the spray cooling pond and cooling tower. During the cool season of the year, the refrigerators are by-passed.

The yeast wort is concentrated by passing it through the yeast centrifugal separators. A battery of 18 yeast separators are provided. The concentrated yeast is then washed with clean water and reconcentrated in separators. It is then dried on 16 double drum driers. The yeast powder is screened and blended in special equipment. The quality of yeast is, of course, strictly controlled by precision laboratory equipment.

Conclusion: The main production of the Taiwan Sugar Corporation is, of course, sugar. However, many by-products besides yeast—such as alcohol, bagasse board, pineapple, hog and agricultural chemicals, etc., have been developed. The object is to support sugar sales, earn more foreign exchange and widen the export market. Yeast is only one of the by-products produced in Taiwan Sugar Corporation. It is either used for local consumption or for export.

■

New Design of Bulk Sugar Transport

A new vehicle for the bulk carriage and low pressure pneumatic discharge of sugar to overhead storage, has recently been completed by Bonallack & Sons Ltd., of Essex, England, for the Westburn Sugar Refineries, Ltd.

An article "Light Metals" states that the new all-aluminum unit carries its load in three separate hoppers, each with a capacity of five tons, pressurized to 10 lb/sq. in. These are mounted on a Crane 15/16 ton semi-trailer tandem axle chassis drawn by a tractor. The vehicle utilizes a blown-discharge technique very similar to that developed by Bonallack in the past two years, but it differs from the well-known tip and blow models built for cement, lime, flour and other products, in that it is designed specifically for the carriage of bulk sugar and that discharge is carried out solely by the air pressure built up by the blower. Mounted immediately behind the cab of the vehicle is a positive displacement blower, driven from the tractor gearbox via a power take-off unit, a V-belt drive and step-up gear box, and supplying 600 cu-ft of free air per minute at a maximum pressure of 10 lb/sq.in. Provision has been made for the air to be filtered before it reaches the hoppers. Discharge from the aluminum containers is through a single manifold running beneath the entire length of the trailer and coupled at the scene of operations by a flexible large-bore hose to the storage tank intake. Teleflex controls are grouped on a single panel mounted at the front near-side of the semi-trailer. These operate three butterfly valves controlling the rate of sugar flowing into the discharge manifold and a full-flow butterfly valve regulating the main air flow. In preliminary tests the vehicle discharged sugar over a total distance of 110 ft. (75 ft. vertical lift, the remainder horizontal). The rate of discharge in these initial tests was equivalent to 25 tons per hour.

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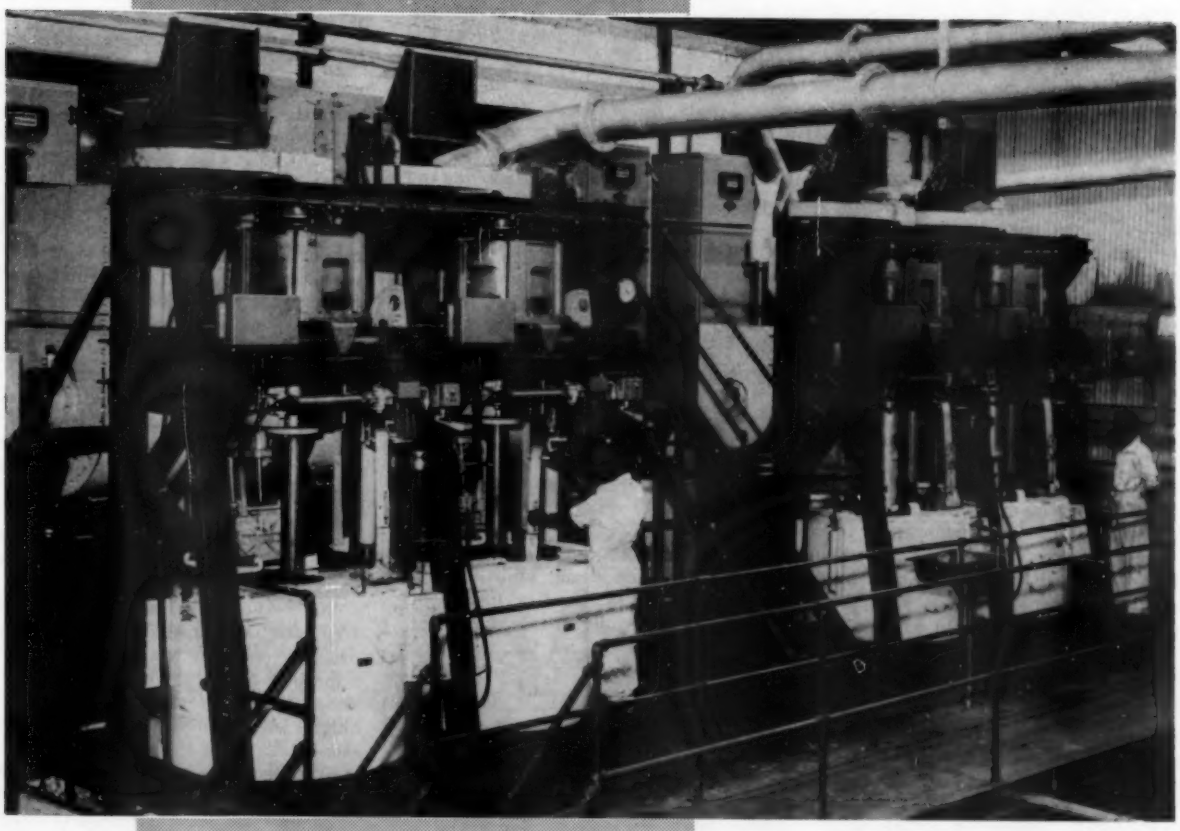

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Sugar's Progress in

HUMAN RELATIONS

Roy J. Leffingwell

Communication Is Important Management Tool

"Just tell workers to do what they are told, and we will get along fine." This was the statement given me shortly after World War II when we first attempted to develop a communication program in the Hawaiian sugar industry.

Only months had passed before the industry was almost completely unionized. This was the first nearly-total unionization of any agricultural industry in the world.

Management was caught without any method of explaining their position; their profits, or their opinions. The union established their communication channels fast. They used to tell employes how rich the fat, bloated, sugar owners were. Employes were led to believe that their wages could be doubled or tripled without taking more than one cigar out of the mouths of the rich stockholders. In fact, this could be done, plus a cut in the hours of work, they were told.

These were not the facts, but when the situation becomes emotionally charged, facts have little value. They are seldom believed or accepted. Changing attitudes and opinions is one of the great management problems.

It requires a long period of patient education to get workers to understand economic facts. The actual profit and loss figures must be placed in front of employes—over a period of many years. It also requires that management explain productivity in a way that the least intelligent worker can grasp.

The best way to communicate is through person-to-person conversation, backed up with printed material restating the main points of your presentation, that can be handed to the individual at the conclusion of the discussion. It is imperative that the worker be allowed to participate in the conversation and ask questions.

Obviously, where several hundred, or thousand employes are involved this process is too slow. Communication must then be carried on by group meetings and written material presented in the form of regular newsletters or other types of publication. Material can also be placed on bulletin boards. If these boards are kept fresh and interesting they provide an excellent means of carrying information, otherwise, they are worthless.

Every sugar area in the world is facing the problem of using more machines in order to meet demands for higher wages. However, there are many problems involved in making the change-over to mechanization. Personal security is one of the most important of all human needs. Machines create a fear of men losing their jobs. So, as management moves toward mechanization in order to satisfy the demand for higher wages, other problems arise.

The only efficient solution to employe-management relations is to develop a working team with mutual understanding of problems. To understand problems it is necessary that employes know what they are, and the facts surrounding them. This calls for communication—both down to employes and up from employes to management.

Communication is vital in any modern industrial operation. So far, the sugar industry has not utilized this valuable management tool as effectively as they might.

Mechanization is the factor that permits increased wages and other benefits to sugar workers. As Hawaii has achieved the highest degree of mechanization—and the highest wages—it is interesting to see what workers are receiving.

Ewa Plantation Co. issued the following statement in their 1960 annual report:

Where Do The EWA Sugar Workers Stand At The End Of 1960?

His wages and benefits:

Average hourly earnings, including overtime and premiums, of $1.74 plus an additional 54 cents hourly in fringe benefits for an average hourly total of $2.28.

His paid holidays:

Six per year.

His vacation:

After one years' service—one week.

After two years' service—two weeks. (With the privilege of accumulating one week to add to a later vacation.)

After 20 years—three weeks. (With the same privilege as above.)

When he is unable to work due to illness:

Two-thirds pay for up to 48 days, depending upon length of service.

When he or his dependents are ill:

Complete medical and hospital services at less than the cost of insurance plans.

His home:

The plantation has available for employees over 720 low rental homes.

When he retires.

A generous pension plan which is insured to protect the employees' pension in the event the company's fortunes should change.

His working conditions:

An eight-hour day, five-day week.

An answer through his supervisor and union to any on-the-job problem.

Oahu Sugar Co., in Hawaii, had no disabling accidents during the year 1960 in which they worked over 1,600,000 man hours.

Only one other company in the U. S. had an equally good safety record, according to the National Safety Council.

Safety is also in the news in the Indian sugar industry. A bill to provide for compulsory inquiry into serious accidents and to fix their cause and responsibility and prescribe penalty for those found guilty, is expected to be introduced into Parliament.

In addition, it is also proposed to appoint safety officers in factories, employing more than a specified number of employes.

The government is examining details of a plan to institute safety awards at the Central and State level.

Also, the Union Government is considering further amendment of the Workmen's Compensation Act to provide for doubling of the rate of payment and for replacement of the present system of lump-sum payments by a pension system.

The "agency shop" is a new concept in U. S. labor unions. Since its beginnings, organized labor has worried about the "free rider." These are employes who refuse to join a union and thus enjoy the benefits without paying their share of the union's expense. Not only do union leaders consider free riding unfair to dues-paying members and the union's treasury, but it impairs its bargaining position.

The "closed shop" and the "union shop" are labor agreements that eliminate the problem—as every worker is required to be a member of the union to hold a job. But, under U. S. law the closed shop is prohibited and 19 states have prohibited union shops.

Now, the unions have come up with a new idea. They demand that the company write into the labor contract that an employe who does not choose to join the union must nevertheless pay a fee to the union for acting as his bargaining agent. This is usually the same amount as union dues. Failure to pay is a dismissal offense under the contract.

Only a few companies have been forced into accepting this provision. But, the number is increasing.

facts about sugar

NEW YORK, JUNE 8, 1961: The government on June 1 authorized the purchase of an additional 1,009,120 tons of non-quota sugar. A total of 9,800,000 tons of quota and non-quota sugar may now be marketed or imported during the current year. B. W. Dyer & Co., Sugar Economists & Brokers, estimate that refined sugar deliveries in 1961 should not exceed 9.5 million tons, unless stimulated by "scare" buying over some international political development.

According to Department of Agriculture & State officials, several of the regular countries were unable to supply portions of the non-quota prorations as follows:—Mexico 175,090 tons; Nicaragua 95,122; Peru 400,520; and the Philippines 150,000 tons. Consequently, the new non-quota authorizations were distributed as follows:—Mexico 58,648 tons; Haiti 10,000; Netherlands 4,388; Taiwan 94,778; Costa Rica 10,000; Brazil 225,000; Belgium 1,092; Hong Kong 8; Federation of West Indies and British Guiana 190,206; Guatemala 5,000; Ecuador 15,000; Colombia 25,000; French West Indies 50,000; Australia 90,000; Paraguay 5,000; and India 225,000. The Dominican Republic proration of 200,000 tons was not reallocated to other countries.

The assassination of Dominican Dictator Rafael Trujillo on May 30 has raised the possibility that the U. S. might again permit the authorization of Dominican non-quota sugar if an acceptable regime were established. Although it is estimated that much of the Dominican sugar is already committed to the world market, it is believed that some could be diverted to the more lucrative U. S. market. There is also the possibility of speeding up the starting date of the next crop.

Domestic (#7) spot raw sugar prices advanced persistently from $6.28 per 100 lbs. at the beginning of May to $6.55 late in the month. The advance was attributed to the government's delay in authorizing the additional replacement sugar. However, after the June 1 announcement, prices declined, and were $6.50 on June 8.

Refined sugar prices were advanced $.15 per 100 pounds on all industrial grade on May 11, but cane refiners and beet processors accepted day-to-day orders at the old prices until the close of business May 26. After that, Northeastern cane sugar prices generally became $9.55; Gulf $9.65; Chicago-West and Southwest $8.95; beet processors prices on the Chicago-West $8.75.

The announced advance in refined sugar prices stimulated deliveries, and through May 27 distribution was 224,000 tons ahead of the corresponding period last year. "Invisible" inventories (those held by industrial users, etc.) were built up substantially in May, which may cause deliveries to run below normal seasonal expectations in the ensuing months, provided that some international political incident doesn't cause scare buying.

Sugar Prices—June 8, 1961

Duty Paid Bulk (#7) Raw Sugar N. Y.	**6.50**
Average #7 Raw Sugar Jan. 1 to June 8	**6.35**
Refined Sugar Gross N. Y.	**9.55**
#8 Raw Sugar (f.o.b. and stowed)	**3.30**
Average #8 Sugar Jan. 1 to June 8	**3.11**

Future Prices	*Contract #8*	*Contract #7*
July 1961	**3.28**	**6.47**
Sept. 1961	**3.19**	**6.43**
Oct. 1961	**3.17**	...
Nov. 1961	...	**6.43**
March 1962	**3.05**	**6.31**

The House Agriculture Committee held hearings on May 18 and May 19 at which spokesmen for new beet growing areas requested increased quotas under long term legislation. The American Farm Bureau recommended that the Sugar Act be extended for five years from Jan. 1, 1962 through Dec. 31, 1966. Also that the legislation give 75% of the annual increase in U. S. sugar requirements above 9.6 million tons to the domestic areas. (Under the present law, domestic sugar producers receive 55% of the growth in requirements above 8,350,000 tons.) In making the proposed increase, the Farm Bureau suggested that 20% of the annual growth would be deducted from the 29.59% reserved for Cuba's participation in such growth before her quota was suspended. Also, since Hawaii, Puerto Rico and the Virgin Islands have been unable to fill their quotas in recent years, it was proposed that the first 525,000 tons of the domestic share of growth above 9.6 million tons be apportioned to beet and mainland cane areas on the basis of their basic quotas. However, it was reported that Chairman Cooley (D., N. C.) of the House Agriculture Committee does not favor an expansion of the domestic industry's share.

World (#8) spot raw sugar prices on the N. Y. Coffee and Sugar Exchange gradually advanced from 3.25¢ per pound, f.o.b. and stowed, at the beginning of May to 3.42¢ on May 24, but declined after that to 3.30¢ when Cuba cut its export price and increased offerings when the non-quota authorization eliminated some nations hopes of participating in the more lucrative U. S. market.

Cuban production in mid-May exceeded six million Spanish long tons, (about 6.8 million short tons), according to a statement by Capt. Jimenez, Director of the Agrarian Reform Institute, which naturally cannot be confirmed. He also claimed that there were prospects of producing an additional 1,000,000 tons.

The International Sugar Council met in London on May 30, and estimated 1961 free market net import requirements at 8,510,000 metric tons (about 9,380,000 short tons), or 1,753,000 short tons above the February estimate. The increase was anticipated in February, however, when 1.9 million short tons of Cuban sugar was tentatively mentioned as going to Russia if the U. S. did not buy Cuban sugar. In the latest estimate, Russia's requirements were increased by 1,240,000 short tons and Red China's by 474,000 short tons thereby confirming most of the previous provisional figure. The Council estimated that available supplies for the free market totalled 9,407,000 short tons, after deducting 1,151,000 short tons of deficits which have not been redistributed. Thus, the Council estimates that supplies and requirements are in balance.

The Council also noted the marked discrepancies between the N. Y. and London prices, and decided to supplement its price criterion by establishing that this will be either the arithmetical average of the N. Y. Spot and London Daily Prices, or, if the difference between the two prices is more

than six cents, the lower of these two prices plus three points.

Low Cost Seed In Puerto Rico

San Juan, June 1, 1961: As in previous years the Puerto Rico Land Authority will offer to growers choice sugar cane seed of best varieties for new plantings. Sugar cane growers will be able to get such seed at low prices under the Program on Incentive Payments for New Cane Plantings. The Authority is authorized to discount the amount spent for seed from total crop income of sugar cane growers. The following high quality cane varieties will be distributed: P. R. 980, P. R. 1013, B. 4362 and M. 336. The Land Authority reports having 40,000 tons of seed.

In accordance with a recent report issued by the Agricultural Experiment Station, during the 1960 sugar crop, 346,577 acres of sugar cane were cut as follows: ratoons 81.0%, spring cane 12.2%, *gran cultura* 5.4% and transferences 1.4%. POJ-2878 was the principal variety despite the Agricultural Station's recommendation that it be replaced by others of higher yields. The area for POJ-2878 was 29.19% and for P. R. 980 20.44%, followed by B-37161 and M-336. However, it is reported that for 1961 the area of P. R. 980 is bigger than the area for POJ-2878. It is astonishing to observe the increase in plantings of P. R. 980 variety, which was practically harvested for first time in Puerto Rico in 1956. It has been very successful in some regions of the island but not in others.

On May 31 two sugar mills ended their grinding season: Central Lafayette at Arroyo; and Central Plena, at San Sebastián. Cane ground by 29 sugar mills in the island amounted on May 31 to 8,341,637 tons, producing 859,248 tons of sugar with an average yield of 10.301%.

The Government of Puerto Rico authorized the Department of Agriculture to continue the Program on Incentive Payments for New Cane Plantings, appropriating $1,400,000 for such a purpose. It is hoped that in 1961 plantings will be 37,000 acres; and 26,500 acres will receive incentive payments in accordance with the pattern of this program. Area to be renovated in 1961 may reach to 57,000 acres, including plantings made by sugar centrals and Land Authority, which are not included by law to receive incentive payments. From 1957 to 1960 the Program has paid $5,233,800 to 11,774 sugar cane growers.

Central Guánica, owned by South Porto Rico Sugar Co., will grind this year about one million tons of sugar cane. Since 1937 this sugar mill has not reached such big amount of cane. Hugh H. Oliver, President of the South Porto Rico Sugar Co. said that such important achievement was obtained through combined factors: labor peace based on contracts with unions; plenty and well distributed rainfall; use of the most advanced and modern cultivation methods in cane farms. Guánica Agricultural Services Co. is a subsidiary to offer technical help and services to prepare land and develop mechanized cultivation to 1,400 sugar cane planters. Central Guánica is the biggest sugar mill in Puerto Rico.

Strike Threat Ended In Hawaii

Honolulu, May 29, 1961: The previous labor contract between Hawaiian sugar plantations and the International Longshoremen's and Warehousemen's Union expired at the end of January. Work was carried on, with only two short strikes, until a new agreement was signed May 3 for a two-year contract.

A total wage increase of 15¢ per hour, over the next two years, was given by the sugar companies. Seven cents per hour will be paid as an increase during 1961. Four additional cents will be paid starting February 1, 1962 and another four cents on August 1, 1962.

A new feature of the contract is a plan which will give workers, and their dependents over 15 years of age, dental treatment. This provision starts January 31, 1963 —the last day of the new contract.

The new labor agreement provides for a trades progression program. Under this pro-

14 years later . . .

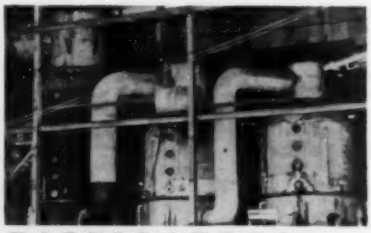
ANOTHER ST. MARY INSTALLATION

The new evaporators at Evan Hall Sugar Factory, with a capacity of 6,000 tons a day, are the largest in Louisiana and among the largest in the world. In 1946, St. Mary fabricated the triple effect evaporator for Evan Hall. In 1960, the factory turned to St. Mary again—this time for both design and fabrication.

The new unit, 44% larger than the old, permits operation in the face of emergency weather. It will pay for itself within 10 years, and will last indefinitely.

St. Mary Iron Works has been working hand in hand with the sugar industry since 1900. Call on us whether you're building a complete new plant or adding a single piece of equipment.

The 1946 unit fabricated by St. Mary Iron Works is a 12'-diameter triple-effect evaporator with a heating surface of 25,000 sq. ft. It has been "retired" and is used only on a stand-by basis, every 10 days when the new unit is being cleaned.



STEEL FABRICATORS

The new triple - effect evaporator is 14' in diameter and has a heating surface of 36,-500 sq. ft. The unit was designed and furnished erected, complete with building and staging.

HALF AROUND THE CENTURY

ST. MARY IRON WORKS INC.
FRANKLIN, LOUISIANA - U. S. A.

ALL AROUND THE WORLD

gram, skilled workers will receive increased pay when they have gained longer experience on the job.

Castle & Cooke, Ltd., the third of Hawaii's Big Five sugar agencies, has announced a six-months option on some 200,000 acres of land in Peru.

Malcolm MacNaughton, president of the company, commented, "I don't think the land should be described as sugar land," however, he did not elaborate.

Interest in Peru is seen as another avenue for expansion of the food-processing and marketing empire which Castle & Cooke is building. Castle & Cooke has recently merged with Dole Corporation and Columbia River Packers Association. This makes Castle & Cooke one of the largest U. S. food distributors.

Total gross income from sugar operations by Hawaiian sugar plantations amounted to $122,562,710.41 in 1960, according to a report of the Hawaiian Sugar Planters' Assn.

Cost of production and delivery at market totaled $124,044,098.29 and sugar operations income taxes were $938,235.80. This resulted in a net loss from sugar operations of $2,419,623.68.

Net income from non-sugar sources was $3,906,158.71.

Total profit from sugar and non-sugar income was $1,486,535.03, on a net worth of $173,027,377.75. Low profits in recent years have been due to the disastrous strike of 1958 and to increasing competition from beet sugar in the Hawaiian marketing area on the West Coast.

Louisiana Investigating Beet Culture

New Orleans, June 6, 1961: Surprisingly low temperatures prevailed in the Louisiana sugar district during the latter half of May and these brought about a deficiency in temperature for the month of sixteen degrees, according to local weather bureau data, which also show a deficiency in temperature since the first of January of 79 degrees.

Fortunately for the Louisiana cane crop, the abnormally cool weather has now given way to more natural conditions and the Louisiana sugar cane crop is continuing to show up very well.

A short course in sugar cane production for farmers and overseers has been proposed by the American Sugar Cane League. This idea was developed and submitted to Louisiana State University by Warren Harang, Jr., League President, and Malcolm Duhe, Chairman of the League's Contact Committee. They suggested that the course be of one week duration and that it be repeated each January and July.

Scientific developments in sugar cane production require that farmers have more technical information than was the case a few years ago. The proposed short course will give farmers instruction in the many technical practices necessary to produce a good cane crop and also the scientific background and reasons for such practices.

Gilbert J. Durbin, General Manager of the American Sugar Cane League, reports that Louisiana State University Plant Pathologist Dr. Rene J. Steib believes that there is a possibility that sugar beets can be successfully grown in Louisiana.

This is not the first time that experiments in growing sugar beets have been conducted in the Louisiana sugar district. Back in 1925-27 beet plantings were made on twenty-nine plantations in fifteen different sugar parishes and for a while the results were very encouraging. It was not long, however, before the beets began to deteriorate rapidly and it was found that they were rotting in the ground because of excessive rainfall and poor drainage. Now Dr. Steib believes that the availability of better sugar beet varieties and new fungicides and new soil fumigants may make it possible to produce successfully sugar beets on a commercial scale in Louisiana. On five varieties of sugar beets tested, Dr. Steib received yields ranging from 17.2 tons to 29.5 tons to the acre. It is noted that the average yield in the states now producing commercial sugar beets is only 17 tons to the acre.

The summer meeting of the American

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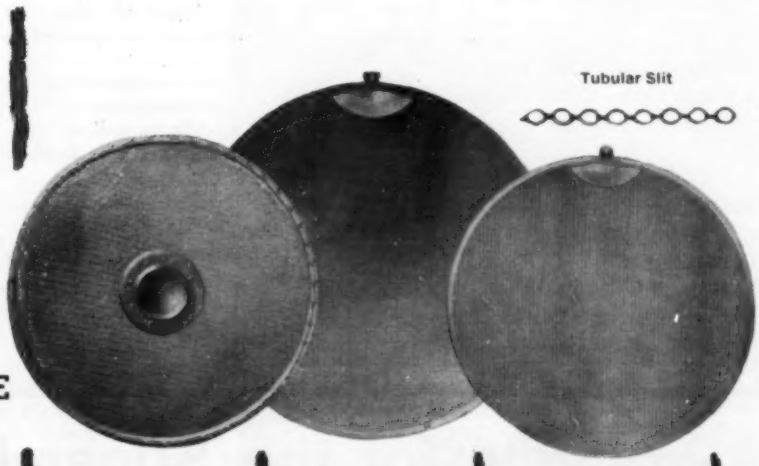

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Society of Sugar Cane Technologists was held in Thibodaux, Louisiana on June 1st. The program was divided in two sessions with the Agricultural Section meeting in the morning and the Manufacturing Section meeting in the afternoon. The following papers were presented at the morning meeting.

Sorgo Research. By Otto Coleman, Superintendent, U. S. Sugar Crops Field Station, U. S. Department of Agriculture, Meridian, Mississippi.

Review of Sugar Beet Research in Louisiana. By Dr. Rene Steib, Plant Pathologist, Louisiana State University, Baton Rouge, Louisiana.

The Role of the Agricultural Extension Agent in the Sugarcane Belt. By E. J. Burleigh, County Agent Iverbille Parish, Plaquemine, Louisiana.

Nematodes in Sugar Cane. By Dr. Wray Birchfield, Nematologist, Agricultural Research Service, U. S. Department of Agriculture, Baton Rouge, Louisiana.

The reports presented at the meeting of the Manufacturing Section in the afternoon were as follows:

Separan AP 30 as a Clarification Agent. By W. F. Guilbeau, E. E. Coll, C. A. Fort, J. T. Jackson, and Dr. L. F. Martin, Southern Regional Research Laboratory, U. S. Department of Agriculture, New Orleans, Louisiana.

The Development of the Rubber-Belt Intermediate Carrier. By A. D. Wilcox, Farrel-Birmingham Co., Ansonia, Connecticut.

The Performance of Individual Grinding Units of Some Tandems. By Louis Cusachs, Baton Rouge, Louisiana.

Sugar Mill Knife Life. By Victor J. Bailliet, Caldwell Sugars Coop., Frank Vought, Westfield Factory, and Luis Suarez, Glenwood Factory.

Mexican Sugar Exports To U. S.

MEXICO CITY, May 26, 1961: Mexican exports to the United States will come to 626,352 short tons. Sugar will enrich Mexico's commercial trade balances by more than $65,000,000.

Feeling in Mexican official and sugar circles is that recent quotas assigned to Mexico by the U. S. are the "salvation" of surplus problems that might have affected the industry.

Federico Patino, head of the National Union of Sugar Producers, pointed out that this year's exports are a "substantial" boost over those of last year, when 390,000 short tons of Mexican sugar moved north of the border.

Unofficial estimates place surpluses at no more than 220,000 short tons, if that. And this will not signify any major cost or warehousing problem, according to Patino.

Mexico is laying plans for the future, and while not generally announced, hope is that production can be boosted to 2,400,000 short tons by 1963. This would be over a 50% increase on 1960 figures.

Sugar mills, heartened by increased American quotas, are looking into expansion and renovation of equipment projects. And there is still the federal aid project to assist industry (through subsidies and tax exemptions) in construction of new mills. This program, announced some time ago, has been marking time.

One unquieting factor, brought up at the recent convention of Mexican cane producers, was an open and outspoken call for the nationalization of the Mexican sugar industry and cane production "as an essential necessity to technify to the maximum industrial processing of sugar and to improve the living standards of 85,000 cane field workers." The quote is that of Vicente Andrade, head of the Federation of Mexican Cane Producers.

This first airing of the "nationalization" issue was heard by representatives of 19 cane regions of the republic as well as 80 sugar mills and observers from associated industries.

India May Reconsider ISC Membership

BOMBAY, JUNE 5, 1961: Disappointment has been expressed in sugar circles here at the amount of United States purchases of Indian sugar. A spokesman at the U. S. Embassy in New Delhi has explained that the announced permission to purchase 225,000 tons of Indian sugar in 1961 represented the final quantity for the entire year. In view of stocks nearing one million tons in India and the rapid expansion of the Indian production this quantity is considered inadequate.

S. K. Patil, Indian Minister of Food, is presently in Washington attempting to negotiate a substantial increase in the amount of sugar that the United States will purchase from India. In order to sell to the U. S. India must become a member of the International Sugar Council. This would limit sales of Indian sugar on the world market to 124,000 metric tons; together with the U. S. quota, total Indian exports would then be limited to 349,000 tons. If Mr. Patil fails to obtain an increase in U. S. quota of at least 200,000 additional tons, the Indian Sugar Mills Association may advise him not to accept the smaller quota and to avoid becoming a member of the International Sugar Council in order to retain freedom to export on the world market. It is felt that exports must total at least 500,000 tons annually which would still provide a carry-over of 500,000 tons.

Meanwhile, markets to the west appear to be opening up. Pakistan has undertaken to purchase 50,000 tons. Sales to Iran become a strong possibility by use of a rail line built during World War II which connects India with the city of Zahadan in East Iran. The quantity in question is at least 200,000 tons. Both Rumania and East Germany bid on Iran's requirements and, while their bids were lower in price than those tendered by India, the lower cost of rail transport made India the favored bidder. Efforts are also being made to sell Indian sugar to Afghanistan in competition with Russia, now the principal supplier of that country. The fact that shipment by rail from India to the west opens possible new markets may have a profound effect on India's decision regarding membership in the International Sugar Council on the basis of a U.S. quota deemed inadequate.

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SUGAR ABSTRACTS

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SUGAR y AZÚCAR — Professor Mario A. Mascaró, Editor

Factory

Use of Automatic 0.05-S Zeiss Polarimeter in the Sugar Industry

I. BECKER, *Zucker, No. 15, pp. 256-7 (1959)*

The new Zeiss automatic flow-tube polarimeter was investigated during the 1958 campaign in the German Institute for Sugar Beet Research. This instrument, instead of being based on visual measurement, employs a system for measuring the electrical properties of light. This has the advantage of eliminating all subjective errors; measurements made by different persons all agree.

The construction of this instrument is rather complicated, but its service is so simple that any ordinary person, after a little instruction, can operate it. No polarization tube is used, and in its place there is a flow-through cell in which samples of a sugar beet juice can be tested one after the other. Ten analyses may be made in five minutes; with an apparatus built for visual operation a highly trained person can hardly make half that many analyses in the same time. The results can be automatically registered, thus eliminating disputes among the farmers and the testing laboratory. Another advantage of the light-electric instrument is that it is little affected by slight turbidity or color of samples which could not be examined with the visual intruments.

Cooling of "B" Massecuite in Werkspoor Crystallizer

Proceedings Ann. Conv. Deccan Sugar Technol. Assn, India, pp. 151-154 (1959)

A straight three boiling system is feasible even with as high purity of A massecuite as 92 with cooling of B massecuite in Werkspoor Crystallizer. Considerable drop in B heavy molasses purity takes place which can be very well used in making a C massecuite of 60 purity from a graining medium purity of even 70. Details of the experiments carried out under varied conditions are given.

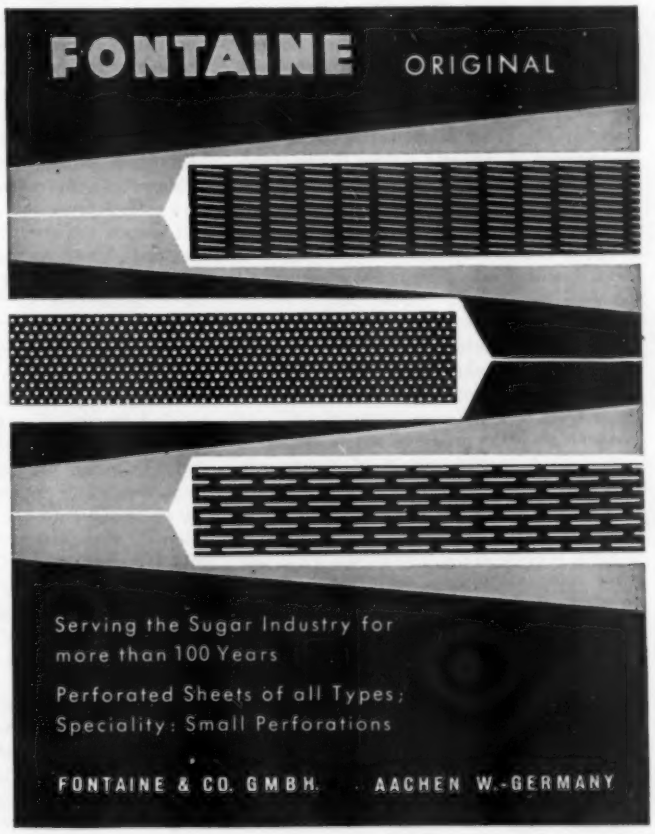
Notes on the Dirty Top Roller

W. R. CRAWFORD, *Proceedings Queensland Society Sugar Cane Technologists, Vol. 26, pp. 57-61 (1959)*

So far as known, Australia is the only country where no scraper is used on the top roller grooving of a cane mill, so that the grooves are kept permanently full of bagasse. Some who use this system not only fill the grooving with bagasse, but also maintain a "wooly" blanket which may cover quite a substantial area of the roller surface. Advocates of the dirty top roller system claim that it leads to better milling work, higher extractions and lower moisture content of the bagasse, and there are some who say that it improves the feeding qualities of a mill.

To obtain information on the subject some experiments were made with a clean and a dirty top roller, respectively. In these tests the top roller was first operated with its grooves clean, and the test was repeated after the grooving was allowed to fill with bagasse.

It was at once obvious that the feeding ability of the mill had been improved. The ultimate crushing rate was about 12% greater with the dirty than with the clean roller, the feed roll extraction was distinctly better and the moisture of the bagasse was smaller; and this was achieved with a smaller mill setting. These tests were made with an experimental mill but it is thought that these findings will apply in general to bagasse mills, and provided roller wear is not excessive, the dirty top roller can be advocated.



European News

(*Continued from page* 10)

is rising more steeply than consumption and to divert resources to meeting the growing demand for animal products.

Producer Prices for Sugar Beet (a)(b)
£ s d per ton

	1955/6	1956/7	1957/8	1958/9	1959/60	Proposed adjustments (c) 1962/3
	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
Belgium	5 0 11	5 2 4	5 6 0	4 12 11	6 8 5	..
	..	(15.3)	(15.8)	(15.4)	(16.0)	
France	5 3 1	4 7 1	4 11 5	3 13 4	5 12 6	+ 0 9 6
W. Germany	5 13 11	5 8 10	6 2 8	6 2 8	7 0 1	— 1 14 8
	..	(15.29)	(15.89)	(15.78)	(17.8)	
Italy	4 11 5	5 0 11	5 2 4	5 8 10	4 15 1	— 1 14 8
	..	(15.98)	..	..	..	
Netherlands	..	3 19 10	4 15 10	4 19 5	5 11 9	+ 0 17 4
	..	(15.68)	(15.90)	(15.85)	(17.39)	
United Kingdom	6 8 5	6 8 5	6 1 2	6 1 2	6 17 11	
	..	(16.1)	(15.28)	(15.08)	(17.4)	
Denmark	4 3 6	4 3 6	5 2 4	4 10 0	4 10 9	
	(16.1)	(17.4)	(16.5)	(16.7)	(18.0)	

Notes: (a) Average price realized over the whole season.
(b) Figures in brackets refer to average suger content.
(c) In target prices for sugar.

THE Annual report for the year to April 1961 of the Coco, Chocolate and Confectionery Alliance (11 Green Street, London, W.1) is, as usual, full of interest on general matters pertaining to these industries and a mine of statistical information: ten pages are occupied by highly detailed tables and large graphs. This body continues to have the support of virtually all the British manufacturers in its field and a list of ordinary and associated members is included.

It has always taken the lead in matters affecting the supply and price of sugar in the UK and it is reported that members of the working party have now completed the series of visits planned to cover all the main sugar-producing areas of the Commonwealth. A comprehensive report summarizing the conclusions reached as a result of these visits is now being prepared.

Although little progress can be reported with regard to the supply of direct consumption sugars to the UK, the Alliance says it has welcomed the continued availability without restriction, of supplies of foreign refined sugar. Although such imports represent only a very small portion of total sugar supplies consumed in the country, the industry attaches great importance to having freedom to obtain its raw materials from all available supply sources.

IRISH SUGAR COMPANY, which handles meat, fish, vegetable and fruit, has brought into production at Mallow (Co. Cork) what is said to be the world's first accelerated freeze drying plant. Based on a new process developed by the British Ministry of Agriculture, this involves freezing the foodstuffs and applying controlled heat within a vacuum which turns the ice into vapor without actually melting it. Natural color texture, flavor, shape and nutritional value are claimed to be retained, and treated foodstuffs kept indefinitely in plastic bags or air-sealed containers without refrigeration. Thus conventional bulky refrigeration equipment in shops and stores can be dispensed with. Five tons a day are now being handled but more equipment is being installed and turnover is expected to be over £1 million in the first year of production.

The company is aiming to become a major food processor, primarily for export, and several cognate projects are in hand to this end. These include a plant to handle 5,000 to 10,000 tons a year of potatoes for the manufacturer of "instant potatoes" by a new U S process.

The cost of these developments is being met out of accumulated reserves. In the balance sheet as at 30 April, 1960, these totalled nearly £3¾ million. All ordinary shares are held by the Irish Government and by policy the company is precluded from competing in the Irish market with private manufacturers, including Irish subsidiaries of British concerns. Where products are deemed competitive, only 10% of output may be sold in the domestic market and this restriction was recently criticized strongly by the company's general manager.

Another interesting recent expansion of interests concerns the famous brewing firm, **Arthur Guinness Sons & Co.**, which already has a successful and profitable confectionery group for which steady growth is confidently expected.

It already owns an 80% interest in Callard & Bowser, a leading sweet manufacturer, and this company is taking over from J. Lyons & Co. the goodwill, trade names and manufacturing facilities of the sugar confectionery and chocolate bar business of its subsidiary, Rolls Confectionery Ltd., a firm with a large and growing business.

SHAREHOLDERS of Sir **J. L. Hulett & Sons Ltd.** in Britain have been reminded that under South Africa's new currency system, the previous monetary unit of one pound (£1) has been replaced by the new unit of one rand (R.1.00). The relationship between the two units is that the equivalent of one pound is two rand, and thus the company's £1 shares have automatically become shares of two rand.

It is now recommended that all shares, at present of a nominal value of R 2.00 each, should be subdivided into shares of R 1.00 each as the directors consider it desirable, and, more convenient for all concerned, that the value of the shares should continue to be South Africa's basic monetary unit.

It is also recommended that the company should capitalize accumulated profits to the extent of R 5.1 million and should issue capitalization shares, to that nominal value, to ordinary shareholders on the basis of three new shares of R 1.00 each for every two subdivided ordinary shares of R 1.00 each held on June 15. It is felt that in this way the company's issued capital will be more closely brought into line with the actual capital employed by the company in its business.

■

Puerto Rican Technologists Plan Annual Meeting

The directors of the Asociación de Técnicos Azucareros de Puerto Rico met to plan their annual meeting for 1961. The date was set for December 6, 7, 8, and 9th.

President Haeussler announced that December 6th would be reserved for a field trip for visitors coming from outside of Puerto Rico. A visit to the Experiment Station will be held in the morning and a trip to Central Roig will be held in the afternoon. Sometime during the day the group will stop on the way for a typical Puerto Rican roast pig dinner given by the Technologists.

The 7th of December will be a general meeting of the complete membership with papers being presented that are of interest to all groups. December 8th will be a split meeting with the Field group, Mechanical group and Mill group meeting to hear papers in their own field. December 9th will be a general meeting for all groups for discussion of problems in labor management on the sugar plantations. This will be followed by the business meeting and the election of officers.

As in past years the directors are doing everything possible to encourage visitors from other sugar areas. Special rates will be announced later for different Hotels in the San Juan area and trips to surrounding sugar companies will be arranged for visitors.

Visitors wishing to attend these meetings should contact Harold A. Willett, Secretary, at Box 137, Aguirre, Puerto Rico.

Sen. Anderson Urges Sugar Legislation in 1961

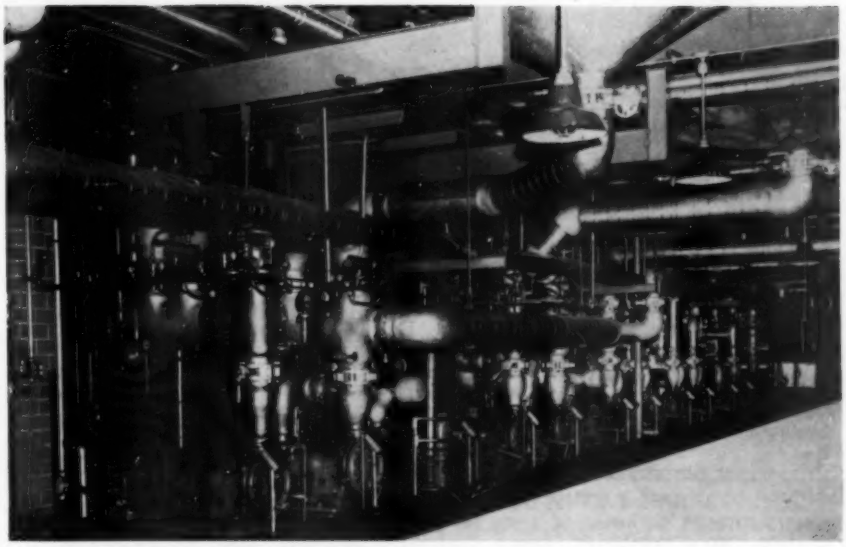
Calling for sugar legislation this year and for a larger share of the U. S. market for U. S. sugar producers, Senator Clinton P. Anderson (D. New Mex.), addressed the annual dinner of The Sugar Club in New York on June 8th. Senator Anderson, former Secretary of Agriculture in the Truman administration, pointed out that since last July when shipments of Cuban sugar to the United States were barred the former Cuban share of the U. S. market has been allocated entirely to foreign sugar producers; the domestic industry, he said, had received no part of the former Cuban quota. Senator Anderson was addressing The Sugar Club dinner at the Savoy Hilton Hotel. This annual event closes the 1960-61 season for this international organization. Robert H. Shields, president of The Sugar Club announced that the membership had increased greatly in the past year and that members now represent sugar trade or government in ten nations on six continents.

"Patents on The Reactions of Sugar"

A booklet describing domestic and foreign patents in which sugar is a reactant, has been released by Sugar Research Foundation, Inc. Compiled by Mildred Hunt, Technical Librarian of the Foundation, the booklet revises and brings up to date an earlier publication of the same title which appeared in 1947. In an introduction, Miss Hunt explains that three criteria were applied to patents included in the review: 1) The reaction should lead to a chemical compound or resinous material; 2) The reaction should be applicable to sugar and invert sugar and, 3) The reactant should be a sugar rather than a sugar derivative. A copy of the booklet may be obtained by writing to Sugar Research Foundation, Inc., 52 Wall Street, New York 5, New York.

New Sugar Refractometer

A new sugar refractometer with a range of 0 to 85° Brix and an accuracy of 0.1° Brix has recently been developed. The instrument, especially designed for use in sugar factory laboratories by Schmidt & Haensch of West Berlin, Germany, is equipped with one universal scale for direct reading of percentages. Adjustments of the compensator are not required. A monochromatic filter attached to the mount of the eyepiece makes the field of view appear in the same color as in polarimeters and other optical instruments used in the sugar industry. The refractometer is equipped with an artificial light source and a thermometer mounted on the housing. A suitable thermostat is provided as optional equipment.



Striking photograph of 12 of the total of 89 Goulds pumps installed at the new Domino refinery of the American Sugar Refining Company in Boston, Mass. The plant was described in detail in the June 1961 issue of Sugar y Azucar. Bronze pumps handle liquid sugar, syrups, sweet water and sugar slurries. Alloy pumps handle phorphoric acid and a stainless steel pump is used for a sodium carbonate solution. Goulds also furnished 16 water pumps and two multi-stage units to handle desuperheater condensate at 190°F.

Freeland To Taiwan

Emile C. Freeland has just completed a two year assignment as Chemical Engineer of the United States Operations Mission to Israel, Tel Aviv and has now assumed the post of Chemical Engineer to the International Cooperation Administration Mutual Security Mission to China, Taipei, Taiwan, where he is expected to be located for the next two years.

1961 Conference of Queensland Technologists

The Queensland Society of Sugar Cane Technologists met in Bundaberg on April 12th to discuss the following technical papers: **Agricultural Section:** Sugar per Acre, *L. G. Vallance;* Variations in Yields, *A. G. Barrie;* Cane Breeding Plans for the Southern Districts, *J. H. Buzacott;* Variety Requirements and Changes in Variety Composition, *J. Anderson;* Special Purpose Variety Plots, *N. McD. Smith;* Leaf Scald Disease in Queensland, *C. G. Hughes;* The Incidence of Leaf Scald in the Tully Area, *E. H. Fox;* Copper Deficiency and its Control, *B. T. Egan* and *G. H. Whitaker;* Soldier Fly Experiments, *R. B. Moller;* Some Notes on Rat Control, *S. Greenaway;* When to Irrigate, *E. Round;* Soil Salinity in Some Queensland Soils, *K. C. Leverington.* **Manufacturing Section:** Further Observations on Milling and Mill Feeding, *H. D. Donnelly;* Improving the Performance of Small Mills, *H. Mackay;* Some Notes on Milling Train Improvements, *C. H. Fitzmaurice;* Influence of Preparation and Mill Feeding on Juice Extraction, *J. D. Perry;* Real Fuel Economy in the Cane Sugar Factory, *G. H. Jenkins;* Extrusion in Bagasse Compression Tests, *J. E. Holt;* Milling Studies—the Effects of Fibre in Cane and Roll Diameter, *C. R. Murry;* Effects of Load and Speed in a Hydraulically Loaded Mill, *C. R. Bagley;* The Effect of Fineness on the Permeability of Prepared Cane, *J. E. Holt;* Notes on the Regulation of Crushing Mills, *W. R. Crawford* & *J. A. McGinn;* A Factory Milling Research Project, *D. S. Shann;* A Mill Steam Turbine Drive Investigation, *H. P. Smart.* **General Section:** Sucrose and the Chemical Industry, *H. H. Hatt;* Automatic Effect Control, *G. A. Naderson* & *K. A. Stuart;* Mechanized Accounting for the Sugar Mill, *G. A. Chenery;* Some Impressions of the European Beet Sugar Industry, *B. J. Rutherford.*

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POSITION WANTED

Mechanical Engineer, 14 years experience in Sugar Industry. Age 37, married. Worked in various capacities in large sugar factory. Seeks suitable position with beet or cane sugar company. Available on short notice.

Write, Box #824, Sugar y Azucar, 25 West 45th Street, New York 36, N. Y.

POSITION WANTED

Supervisor of agriculture. 31 years experience in Cuban Sugar cane, desires position in U.S.A. or foreign country. Speaks Spanish. Write Sugar y Azucar, Box # 827, 25 West 45th Street, New York 36, N. Y.

POSITION WANTED

CHEMICAL ENGINEER, superintendent, single, 38, many years of experience in Latin America, Raw Sugar plants and Refineries, Alcohol distilleries. Trouble shooter. Speak German, English, Spanish perfectly. Write Box #828, Sugar y Azucar, 25 West 45th St., New York 36, N. Y.

POSITION WANTED

Mechanical Engineer, U. S. Citizen, speaks English and Spanish, 25 years experience in the sugar industry of Puerto Rico, Florida and Mexico, desires position as Chief Engineer. Available on short notice.

Write Box #829, Sugar y Azucar, 25 West 45th Street, New York 36, N. Y.

POSITION WANTED

Supervisor, German degree, 38 years old, 6 years of experience, 4 years U.S., production control, development, fermentations, distillation, evaporation, production of liquid and granulated sugar, ethyl and butyl alcohol, gin, baker's yeast, dried solubles. Write Box #830, Sugar y Azucar, 25 West 45th St., New York 36, N. Y.

POSITION WANTED

Chief of Laboratory, Cane sugar industry, 40 years old, 15 years experience. Speaks Spanish and English. Best references. Write Box #831, Sugar y Azucar, 25 West 45th St., New York 36, N. Y.

POSITION WANTED

Factory Manager, Chemical and Mechanical Engineer, over 10 years experience in raw and refined sugar, alcohol production, factory layout, automation and modernization in Africa and Caribbean. Speaks English, French, German and Spanish. Seeks position in Latin or Central America. Write Box #832, Sugar y Azucar, 25 West 45th St., New York 36, N. Y.

POSITION WANTED

Field Superintendent 16 years experience in sugar cane plantations in Cuba, Central America and Louisiana. Age 40, married. Agricultural Engineer and expert in Sugar.. Fluent Spanish, some English. Resume upon request. Write, Box 833, Sugar y Azucar, 25 West 45th Street, New York 36, N. Y.

SUGAR MILLING RESEARCH INSTITUTE

University of Natal, Durban.

Applications are invited for the post of Assistant-Director of the above Institute, for the Natal Sugar Millers' Association, under the Council for Scientific and Industrial Research research association scheme.

Duties will involve assisting the Director in the administration and management of the Institute, under a Board of Control, and in directing the Research Programme.

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A commensurate salary will be determined for a suitable appointee.

Additional information will be supplied on request by the Director of the Institute. Applications accompanied by the names of 2 referees should be sent to the Director to reach him before 15th September, 1961, at the address below:

The Director
Sugar Milling Research Institute,
University Private Bag,
King George V Avenue,
DURBAN (South Africa)

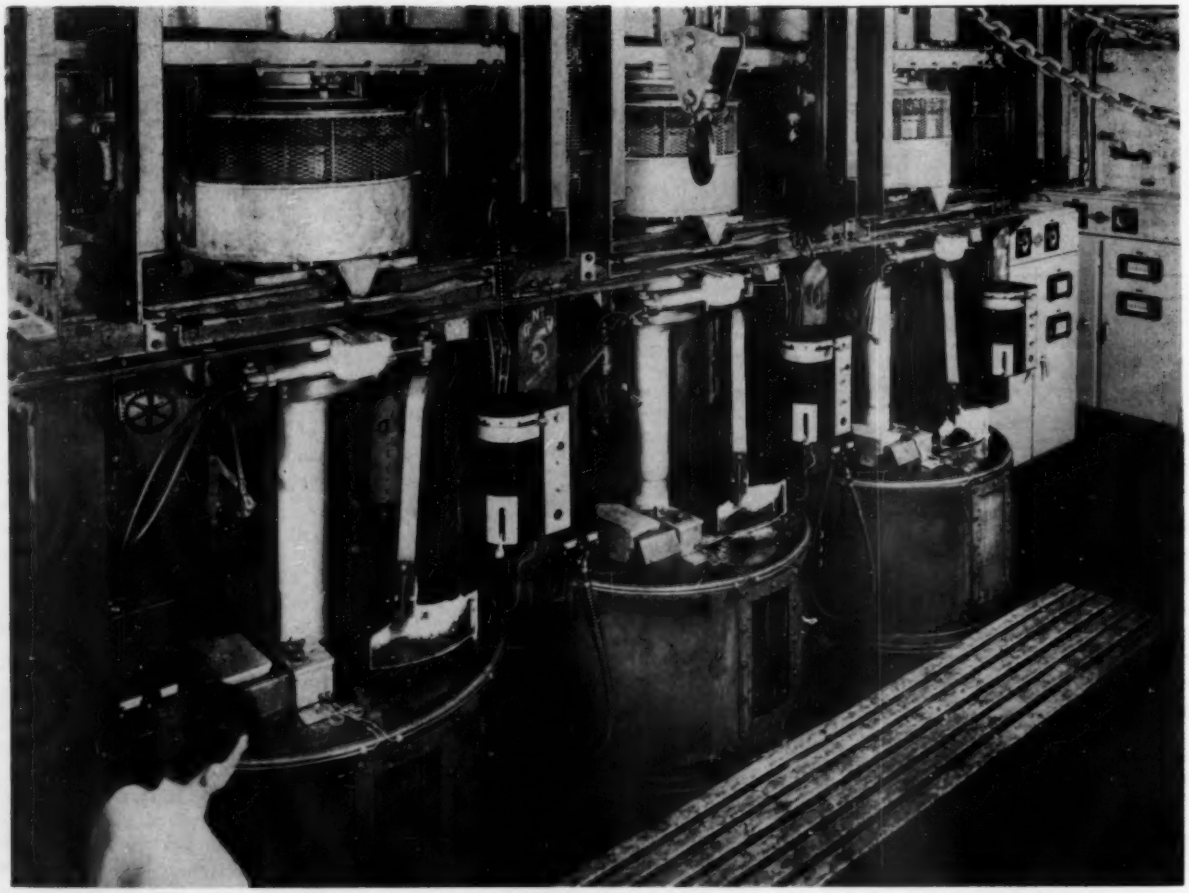
Beet Sugar Industry Efficiency

The number of man-minutes required to process a ton of sugar beet in England has been reduced from 76 in 1950-51 to 48 at the present time. Also modern extraction equipment has made it possible to remove 96.75% of sugar which is in the beets. Sir Edmund Bacon, chairman of British Sugar Corporation Ltd. in making these points to "Producers' Review" adds that compared with the extraction figure at the end of the war, a recovery of some additional 35,000 tons of sugar a year is being made. Modernization of the Corporation's factories has increased capacity to 50,000 tons of sugar beet per twenty-four hours.

Promotions At Savannah

Thomas Oxnard, formerly president of Savannah Sugar Refining Corporation, has been elected chairman of the board and chief executive officer. At the same meeting on June 9th, **Lawton M. Calhoun,** executive vice president was advanced to the position of president. **Robert O. Sprague,** formerly vice president, secretary and treasurer, resigned as secretary and was elected executive vice president and treasurer. He was succeeded as secretary by **William W. Sprague Jr.** who had been assistant secretary of the corporation.

Late in 1960 Guatemala was awarded a supplementary quota of 6,000 tons as part of the reduced quota formerly shipped from Cuba to the United States. With the year end practically in sight, cooperation between the sugar industry, Guatemalan government and shipping concerns the total quantity was shipped in 15 days. Here, final sugar cargo is being loaded on ss. Karl Christian *in the Port of Matias de Galvez for shipment to the Pepsi Cola refinery in Long Island City.*



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Investigaciones sobre la Enfermedad de la Raya Clorótica de la Caña de Azucar

por O. W. Sturgess

(Patólogo de Investigaciones, Buró de Estaciones Experimentales Azucareras, Queensland)

DURANTE el año de 1958 Bird *et alia*[1] en Puerto Rico, Sturgess[2] y Egan (en la prensa) en Queensland, trabajando independientemente, establecieron que la enfermedad de la raya clorótica de la caña de azúcar puede ser trasmitida desde plantas enfermas á plantas sanas al crecer entrambos, juntas en soluciones nutrientes ó separadas sin contacto directo en las raíces, pero con soluciones nutrientes comunes. Ultimamente gracias á trabajos realizados en Brisbane se han ampliado los conocimientos sobre la enfermedad en relación á su trasmisión por inoculación mecánica y por medio del suelo, el comportamiento del agente causal en los suelos, el tamaño aproximado del agente causal, su trasmisión á un huésped alternativo y sobre el efecto de la temperatura en el desarrollo de la enfermedad y el zumo foliar.

Se prepararon extractos de plantas de cañas enfermas por medio de la maceración de hojas rayadas, la extracción á presion de jugo del tallo ó la desmenuzación de sistemas de raíces, tomadas de soluciones de cultivos. Se hicieron las inoculaciones dentro de las raíces de plantas sanas directamente ó por medio de una fina aguja hipodérmica ó por la inmersión del sistema de raíces intacto durante siete días, en el extracto diluído 1 en 20 con solución nutriente. Las plantas inoculadas fueron trasladadas á soluciones cultivo con arena-nutrientes y mantenidas en el invernadero con un número adecuado de plantas tratadas con extractos de plantas sanas. Se obtuvo la trasmisión de la enfermedad de la raya clorótica con cada método de inoculación, pero sólo con extractos obtenidos de raíces enfermas. Probablemente indicando que las raíces pueden ser el punto de mayor concentración ó multiplicación del agente causal.

La trasmisión directa por medio del suelo se obtuvo sembrando surcos alternos de plantas enfermas y sanas, dentro del invernadero y llenando los surcos con tierra recolectada en el campo, en la base de plantones que obviamente presentaban síntomas de la enfermedad. El invernadero fué inundado á intervalos para producir las condiciones características de los campos donde la enfermedad se presenta naturalmente. Sobre un período de casi dos años, durante el cual la caña retoñó, el 16% de las plantas originalmente sanas presentaron síntomas. En Junio de 1960; esto es, en la mitad del invierno, todas las plantas fueron excavadas y extraídas y eliminados con tenedores todos los restos posibles. Despues de un período de 47 días se sembraron plantones de la variedad N.Co.310; y despues que aparecieron los primeros renuevos, se inundó el suelo todos los días excepto los finales de semana. A los 176 días despues de la siembra se cortaron todos los tallos á aproximadamente seis pulgadas sobre el nivel del suelo. Había ocurrido cierto número de trasmisiones: aproximadamente el cuatro por ciento de los plantones. Estaba claro que la enfermedad de la raya clorótica puede trasmitirse en el suelo de una planta á la otra, en ausencia de cualquier planta huésped, (organismo sobre el que vive otro organismo parasitario).

Otros experimentos en los suelos han revelado un interesante aspecto en relación con la transmisibilidad de la raya clorótica por medio del agua del suelo. La unidad experimental estaba integrada por tambores ó cilindros de cuatro galones pareados, uno sobre otro y conectados con tubos de goma plástica. Tratamientos duplicados de seis combinaciones pareadas de suelos esterilizados ó nó-esterilizados procedentes de la base de retoños enfermos; y posturas saludables y enfermas fueron acomodadas en los tambores. Los resultados sobre trasmisión mostraron que los suelos sin esterilizar tienen un efecto adverso sobre la transmisibilidad de la enfermedad á través de la porosidad y lixiviación del suelo. Lixiviaciones procedentes de plantas enfermas desarrollándose tanto en suelos esterilizados como nó-esterlizados demostraron ser infecciosas solamente cuando atravesaban suelos esterilizados. Se demuestra hasta la evidencia que es posible el criterio de que en los suelos existe "un poder para inhibir la infección de virus"[3] y que éste poder ó fuerza se reduce con la esterilización del suelo.

El porcentaje de trasmisión con extracto diluído de las raíces fué lo suficientemente alto para garantizar la aplicación de la técnica de inoculación de las raíces al determinar la dimensión aproximada del agente causal. Los extractos fueron filtrados en serie á través de vidrio concrecionado y discos standard de filtros bacteriológicos. Los filtrados fueron diluídos 1 en 20 con solución nutriente y raíces de las plantas ensayadas sumergidas hasta ocho días. Se obtuvo la trasmisión con todos los filtrados hasta el mas fino de los usados: una almohadilla (Ekwip D9) con una retención inicial de todas las partículas menores de 0.5 micrones. Como resultado de todo ésto aparece que el agente causal es un virus.

La Hierba Elefante, (*Pennisetum purpureum, Schum.*) ha sido reportada como una probable planta huésped de la enfermedad de la raya clorótica en Hawaii, Puerto Rico y Australia, mayormente sobre la base de cierta semejanza de las rayas en élla á aquellas correspondientes á la enfermedad en la caña. En Puerto Rico el tratamiento de las plantas en agua á 52o. Centígrados por 20 minutos, que es efectivo y curativo para la enfermedad en la caña, tambien dejó á la Hierba Elefante libre de la afección. Se arreglaron cultivos en arena conteniendo (a) Plantas de semilla de la hierba elefante dentro del mismo vivero con renuevos de cañas enfermas; (b) Plantas de hierba elefante (originalmente de material con rayas en Mossman, Norte de Queensland), mostrando rayas en el mismo vivero con renuevos de cañas sanas; y (c) Plantas de semilla de hierba elefante y renuevos de cañas sanas. La trasmisión ocurrió en los tratamientos (a) y (b) demostrando que la enfermedad en la hierba elefante era la raya clorótica y que podía ser trasmitida en ambas formas: de la hierba á la caña y viceversa.

Los estudios sobre la enfermedad de la raya clorótica en Queensland y en todas partes han sido difíciles por las amplias variaciones en la manifestación de los síntomas bajo condiciones climatológicas variables. Durante la mayor parte del año el comportamiento errático del crecimiento de plantas enfermas en invernaderos sub-tropicales hizo difícil la interpretación de los resultados experimentales. En la creencia que las temperaturas pudieran jugar una parte importante, se hicieron experimentos con cultivos en soluciones nutrientes aereadas mantenidas á temperaturas precisas en el local. Los resultados indicaron que el zumo foliar depende de la temperatura y que la temperatura óptima está ubicada dentro de un estrecho recorrido entre 25 á 30 grados centígrados. Por debajo de 25 grados centígrados las reacciones de la planta se hacen erráticas é inciertas, una gran parte ó proporción de las plantas surgiendo de plantones enfermos lo mismo pueden no mostrar síntomas en las hojas ó mostrar síntomas solamente por breves períodos. Evidencias recientes derivadas de un experimento último indican que los niveles de las temperaturas fluctuantes del aire, afectando otras partes de las plantas enfermas, son tambien de importancia.

Los resultados de éstos estudios recientes

(Signe en la página 68)

Restableciendo la industria azucarera en Marruecos; pero ésta vez utilizando remolacha como materia prima. La fotografía muestra la preparación de tierras en la región de Gharb, antes de sembrarlas con remolacha azucarera.

Restableciendo una Industria del Siglo XVI

Remolacha Azucarera en Marruecos

por M. R. Bull

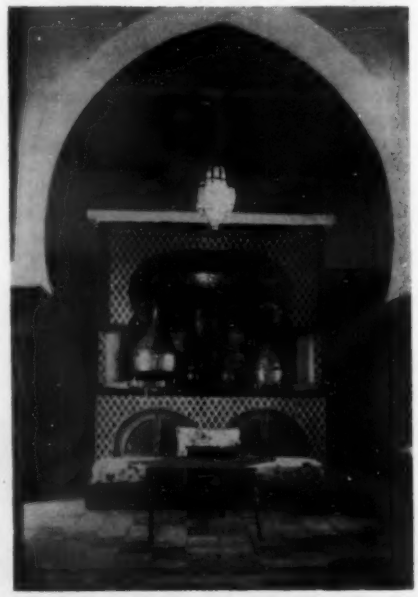
La caña de azúcar creció en el Oriente por muchos siglos antes de ser traída al área del Mediterráneo por los Arabes en el siglo IX. La remolacha azucarera se cultivó mucho después. Debido á condiciones propicias la caña de azúcar se desarrolló satisfactoriamente en ambos países, España y Marruecos.

En realidad, desde el siglo X al XVI en Marruecos se cultivó tanto que pudo exportar considerables cantidades. La corte de la Reina Isabel I de Inglaterra saboreaó el azúcar de Marruecos y se exportó Italia por su peso en mármol de Carrara. En la actualidad los visitantes pueden aún admirar las hermosas Tumbas de Saadien, construídas por los Sultanes de Marruecos con éstos mármoles.

La caña se ha cultivado en el valle Souss, al sur del Alto Atlas, donde las condiciones de irrigación y clima son favorables. Recientes excavaciones han descubierto las ruinas de acueductos, tanques de loza de barro y millares de moldes de alfarería rotos, de la misma forma y tamaño de los usados actualmente en la moderna refinería de Casablanca para fundir panes ó pilones de azúcar de dos kilogramos cada uno. Las guerras é invasiones destruyeron ésta industria, dejando de cultivarse la caña en Marruecos y el azúcar tuvo que importarse.

Hasta mediados del pasado siglo el consumo de azúcar no era alto. Pero con la creciente popularidad del té con menta muy dulce, que se ha convertido en la bebida nacional, el consumo ha aumentado tanto que actualmente Marruecos es uno de los mayores consumidores, con á 30 á 35 kilogramos por persona al año. Las necesidades del país son ya alrededor de 350,000 toneladas anuales y considerando el gran incremento de la población, ésta cantidad tambien aumentará.

Hasta ahora toda el azúcar ha sido importada. Y hasta fecha reciente Marruecos ha recibido la ayuda de los Estados Unidos, á través de la ICA para importar azúcar de Cuba. Un total de 240,000 toneladas fueron refinadas en 1958 en Marruecos; importándose los crudos de caña de Cuba, Perú y las Indias Occidentales. Del total mencionado 10,183 toneladas fueron re-exportadas. El tipo más popular de azúcar que se vende localmente es el pilón ó pan de dos kilogramos, de los cuales se consumen anualmente unas 280,000 uni-



Un típico café Moro en Kasbah, Agadir. El dulce té y el fuerte café que gustan determinan un elevado consumo de azúcar.

dades. El azúcar en polvo, unas 36,000 toneladas, se consume en las regiones más pobres por ser más barato (en la actualidad 95 francos marroquíes por kilogramo). Finalmente, alrededor de 7,000 toneladas de azúcar de terrones se consumen por los Europeos y los visitantes extranjeros.

En 1956 una empresa Belga-Holandesa se interesó en fomentar el resurgimiento de la industria azucarera. Se organizó la compañía SOMASUC con la participación del Estado Marroquí, y estudian las posibilidades del cultivo de la remolacha y de la caña, con el establecimiento de las fábricas correspondientes.

La gran refinería COSUMA en Casablanca emplea unas 3,000 personas. Refina 900 toneladas diarias de azúcares crudos procedentes de diferentes regiones. Esta refinería, que cubre unos 110,000 metros cuadrados, tiene la mas moderna maquinaria y su propia urbanización modelo en sus proximidades para el alojamiento de sus empleados.

Debido á la escasez de divisas extranjeras Marruecos desea producir tanta azúcar como sea posible. Los experimentos sobre cultivo de remolacha y de caña empezaron desde 1928; pero sólo desde 1957 se han desarrollado satisfactoriamente dichas pruebas. Se concentraron los esfuerzos en el cultivo de la remolacha por las dificultades en el regadío y por el hecho de que la caña dá empleo solamente una parte del año. Las condiciones de desempleo en Marruecos son elevadas. Varias regiones del norte y del centro son favorables, habiéndose desarrollado con éxito la remolacha en dichos lugares. El contenido de azúcar tambien es bueno—alrededor de 19 á 20%.

En la actualidad en la región de Gharb, una fértil planicie cerca del mar y al norte de Rabat, se pueden cosechar 20 toneladas de remolacha por hectárea. En Round Meknes el rendimiento es solamente entre 12 á 15 toneladas. A causa de la lluvia, unos 600 milímetros, el cultivo de secano de la remolacha puede emprenderse con una siembra de invierno. Los costos del cultivo de la remolacha el año pasado fluctuaron desde 120,000 francos en secano á 130,000 francos con regadío; produciendo respectivamente 23 y 28 toneladas de remolachas.

De acuerdo con las más recientes informaciones, el rendimiento por hectárea ha ido aumentando cada año desde 15 toneladas con 20% de contenido de azúcar á 43 toneladas con 17 á 19% de azúcar para la cosecha de 1959-60. En otra región fué más bien algo más alto. La siembra debe ser temprana para evitar la cosecha durante la estación calurosa del verano. Las siembras en Gharb fueron de Octubre á Febrero, con buenos resultados. En otra región cercana al Middle Atlas, donde es posible el regadío, la siembra se ha efectuado en la primavera.

El Gobierno de Marruecos en unión de la

(Signe en la página 68)

Tanto los ricos como los pobres beben té muy dulce en todo Marruecos. Aquí aparece una primitiva familia Berberisca, del Alto Atlas, sirviendo el té. Golpeando un duro pilón de azúcar con el fondo de un vaso, obtienen terrones de azúcar. El té y el azúcar se aromatizan con hojas de hierbabuena ó menta. El azúcar se guarda en la caja de metal por los pies del muchacho.

Un rincón de las Tumbas de Saadien en Marrakesh, construídas con mármol de Carrara obtenido en trueque por azúcar Marroquí en el siglo XVI.

La Mayor Planta de Levadura del Mundo

Proteína del Azúcar en Taiwan

por Wan-chun Hsu
Taiwan Sugar Corporation

Un cultivador de caña trata sobre problemas agrícolas con el administrador de un central azucarero en Taiwan. Este es uno de los pequeños agricultores cuya cosecha vende á la Taiwan Sugar Corporation para la elaboración de 900,000 toneladas de azúcar anualmente. En la actualidad un importante sub-producto derivado de ésta caña será la levadura, para mejorar el contenido de proteína de la dieta en Taiwan.

Composición de la levadura: Hay muchas clases de levadura existentes en el gran medio ambiente natural. Algunas levaduras pueden producir células mientras otras nó. Por tanto, la composición de las levaduras no puede ser necesariamente la misma. El factor más importante que afecta la composición de las levaduras es el medio ambiente en el cual crecen. Durante la propagación es obtenible amplio abasto de amoníaco y la grasa producida puede ser tan baja como el 2%; por el contrario, si muy poco amoníaco es suministrado, tanto como el 60% de grasa se producirá, á base seca. Por tanto, la composición de la levadura obtenida del análisis puede no representar la composición general de la levadura. Además, los distintos métodos de análisis usados pueden mostrar composiciones diferentes. Los siguientes son dos ejemplos típicos de la composición de levadura:

(1) *Levadura de cerveza*

Proteína	46.74%
Grasa	1.61%
Carbohidratos	35.35%
Cenizas	7.87%
Fibra	8.41%

(2) *Levadura de tórulas*

Agua	5.85%
Cenizas	9.07%
Fósforo	1.92%
Calcio	0.85%
Proteína	47.43%
Grasa	1.01-4.84% (depende del método usado)
Fibra	0.82%
Thiamina	5.3 r/gm.
Riboflavina	45.0 r/gm.
Pyridoxina -HC_1	33.4 r/gm.
Acido Pantoténico	37.2 r/gm.
Biotina	2.3 r/gm.
Acido fólico	21.5 r/gm.

La levadura puede ser usada como proteína: El contenido de proteína en la levadura es probablemente el más alto entre los alimentos esenciales. Los análisis demuestran que el contenido de proteína en la levadura excede al de la soya por 21.4%, maní por 44.8%, leche en polvo por 44.8%, carne de res seca por 35.8%, huevos por 71.3%, jamón por 65.1% y el del pescado por 44.9%. Por ésta razón el contenido en proteínas de la levadura ha recibido tanta atención por parte de las autoridades mundiales en alimentos. Sin embargo, el sólo elevado contenido de proteína no es suficiente para justificar el valor alimenticio de la levadura. Hay que tomar un paso adicional para determinar la cantidad de amino ácidos que contiene la levadura y como están distribuídos los mismos, antes de evaluar sus méritos nutritivos. La tabla siguiente ilustra tales análisis:

Amino Acidos	*Levadura de-Cerveza*	*Levadura de Tórulas*
Arginina	3.1%	3.61%
Histidina	3.3	1.31
Leucina	7.3	4.14
Lysina	7.1	—
Isoleucina	6.0	3.75
Threonina	5.5	2.58
Tryptofan	1.2	0.66
Methionina	2.7	0.84
Fenilalanina	4.5	2.41
Valina	5.3	2.89
Cistina	1.1	0.68
Tirosina	3.8	—
Glicina	—	0.22
Acido glutámico	—	6.90

Los primeros diez arriba citados son los amino ácidos esenciales, los cuales son necesarios para el adecuado crecimiento del cuerpo humano. En otras palabras, las proteínas que contienen éstos diez amino ácidos se les denomina proteínas completas y son un valioso alimento para el ser humano. Es evidente que la levadura de cerveza es una de las clases de proteínas completas. Además, la levadura contiene una clase de polipéptido llamado glutationa. Si la cantidad es de 0.2% á base seca, constituye un agente desintoxicante muy útil.

El valor proteico de la levadura ha sido probado por muchos expertos en alimentos. Experimentos realizados muestran que en el caso que no se añada proteína methionina á la levadura alimenticia, el crecimiento de las ratas es solamente el 60% de la caseína. Este es el resultado de la deficiencia de methionina en la proteína de levadura. Si

se adiciona methionina á la proteína de la levadura en la cantidad correspondiente á la caseína, el valor nutritivo será justamente tan bueno como pura caseína. Por tanto, hay que poner atención cuando se utiliza la levadura como alimento.

Además, la levadura puede usarse para fabricar carne artificial ó jugo de carne. El sabor y el aroma son justamente los mismos que carne verdadera. El proceso es el siguiente: Despues de la plasmolización de levadura fresca y solución de sal, agítese por varias horas á 37 grados centígrados. Después se seca á alta temperatura y alta velocidad. El producto final tiene el aroma de la carne y contiene altos amino ácidos que pueden ser fácilmente digeridos y absorbidos. Si se disuelve la levadura en caseína se obiene una nutritiva dieta para los inválidos.

La levadura puede utilizarse como grasa comestible: Se ha señalado que, si durante el proceso de propagación, se reduce el amoníaco y se aumenta el contenido de azúcar, el contenido de grasa en la levadura puede incrementarse tanto como 60%; entre tanto, las proteínas disminuyen. Tambien se ha señalado que el contenido más económico de grasa sería el 40%; porque porcientos mas elevados tomarían mucho más largos períodos á la levadura para cebar ó engrasar. Es evidente que no llenaría los requerimientos industriales. La levadura combinada con grasa es de color castaño; pero con buen sabor. Dicha grasa contiene ácidos arnquidónico, oleosteárico y liquénico. La grasa de la levadura común sacharomyces no tiene tan buen sabor; pero es apropiada para comer. La composición es la siguiente:

Elementos	*Composición %*
Glicerol	5.3
Acidos volátiles	5.2
Acidos palmíticos	9.5
Acido esteárico	5.9
Acido oléico	47.6
Acido linólico	2.9
Esterol	3.3
Otros	16.6

La levadura puede usarse como aditivo alimenticio: La levadura en sí no es un sólo alimento nutritivo; pero puede usarse como aditivo alimenticio, debido á sus propiedades especiales físicas y químicas. Siendo la levadura un fuerte agente antioxidante, puede usarse como preservativo de alimentos; por ejemplo, para la crema. Y las cualidades del alimento a su vez ser mejoradas.

El polvo de levadura posee características emulsificadoras. Si se mezcla con jabón en polvo seco ayudará á emulsificar el polvo y el agua. Las sopas tendrán mejor sabor. Si se adiciona el polvo de levadura al pan ó los cakes les ofrece una tendencia á conservar su contenido de agua y á prolongar su frescura. Al añadir la levadura á las galleticas se mejora su fragancia y fragilidad.

La levadura puede utilizarse como fuente de vitamina B: El contenido amplio de vitamina B en la levadura es evidente y ha sido mostrado en la tabla que se acompaña. La niacina y la riboflavina, específicamente, están contenidas en el más alto nivel. El contenido de vitamina B en la levadura es de los más altos entre todos los alimentos. Por tanto, la valiosa vitamina B puede obtenerse de la levadura á más bajo costo. Para mejorar su valor nutritivo se debe añadir levadura al pan.

La levadura puede utilizarse como fuente de vitamina D: La levadura contiene muchas clases de esteroles, entre los cuales el ergosterol solamente representa 0.56% base seca. Si se expone á los rayos violeta el ergosterol se le convierte en vitamina D, que constituye un elemento esencial para nuestro cuerpo. Si tomamos diez gramos de levadura cada día proveeremos cinco gramos de proteína, cuaro gramos de carbohidratos, 360 garma de tiamina ó vitamina B_1, 590 garma de riboflavina ó B_2, 5310 garma de ácido nicotínico o vitamina B_5 y 110 garma de ácido fólico. En consecuencia, el empleo de la levadura en nuestra dieta diaria tiene un gran futuro. Probablemente algún día la levadura será tan común en la dieta diaria como el requesón de frijol de soya lo ha sido por miles de años.

La fabricación de levadura en Taiwan: Toda vez que los usos y valores nutritivos de la levadura son grandes y numerosos y la materia prima para la elaboración de la levadura es la miel final de caña, la producción de levadura ha estado presente y pendiente por muchos años en Taiwan. Por otra parte, Taiwan tiene sobrepoblación desde que el Gobierno de China se instaló aquí en 1950. Como ésta isla es además deficiente en proteínas, es necesario importar del extranjero muchos alimentos. Por el año 1951 existía un sobrante de alcohol destilado de las mieles. La Taiwan Sugar Corporation, por tanto, decidió desarrollar la producción de levadura para resolver los problemas de proteínas y deficiencias alimenticias. La Estación Experimental Azucarera de Taiwan condujo la mayoría de las investigaciones y varias fábricas azucareras de la corporación tales como Hsingying, Taichung, Suantou y Chiatou iniciaron la producción de levadura en pequeña escala. Las fases del proceso son las siguientes:

Variedad de levadura	Mieles
Cultivo de tubo de ensayo	Tanque depósito de materia prima
Cultivo de matraz	Tanque de medir
Cultivo de matraz	Tanque de sedimentación
Tanque de cultivo No. 1	Líquido clarificado
Tanque de cultivo No. 2	Máquina de purificación
Tanque de cultivo No. 3	Tanque depósito líquido purificado
Tanque de levadura-semilla	Equipo de enfriamiento

↓

Tanque de fermentación
Separador
Tanque de lavado
Filtro-prensa
Máquina mezcladora
Máquina conformadora
Almacenaje de la producción

El nuevo tractor Americano, que se muestra en camino hácia los campos de caña, es un ejemplo de métodos modernos de cultivo, recolección y transporte que contribuyen á una producción eficiente de azúcar, mieles y levadura en Taiwan.

Tratamiento de la miel: La miel contiene substancias tales como ácido silícico, sulfato de calcio, grasas, fibras, &. que interfieren con los procesos de purificación y filtración y restringen el crecimiento de la levadura elaborado. Por tanto, deben eliminarse. El método ordinario consiste en hervir la miel final con vapor por una hora dejándola sedimentar por 12-24 horas. La capa superior, diluída con agua, se usa para fabricar levadura. El sedimento generalmente alcanza el 12-16% del volúmen original.

Para decolorar la miel pueden usarse bien óxido de calcio ó carbón activado. En el primer caso la miel debe hervirse de manera que la mayoría de las impurezas puedan combinarse con el óxido de calcio para facilitar la filtración. En el segundo el carbón activado tendrá una acción decolorante mayor.

Cultivo de la levadura: El cultivo de la levadura en pequeña escala generalmente utiliza cerveza cruda como agente, mientras que en gran escala se usa miel como más barata. La densidad fluctúa segun la semilla de levadura y los aditivos empleados: carbón activo, bagazo, etc. La preparación de miel amoniacal se hace como sigue:

Miel	150 gramos
Fosfato de calcio	1 gramo
Fosfato de amonio hidrog.	1 gramo
Urea	2 gramo
Acido sulfúrico conc.	2 c.c.
Suficiente agua para	1 litro

Disuelva la miel, el fosfato de calcio y el ácido sulfúrico en agua, siguiendo dicho orden, y esterilice. Despues que se haya enfriado la mezcla añada urea esterilizada y el fosfato de amonio hidrogenado. Ajuste el pH á 4.4.

Control de la fermentación: En el proceso de fermentación el contenido de sacarosa en la batición tiene mucho que ver con el desarrollo de la levadura. Generalmente está entre 0.5-1.5%. En un proceso continuo el contenido de sacarosa puede ser más alto. El valor pH se mantiene á 3.5-4.5. Un valor pH demasiado bajo puede afectar el color de la levadura.

El suministro de aire á la batición constituye uno de los mas importantes factores en la elaboración de la levadura. La finalidad del aire es que el oxígeno del mismo se disuelva rápidamente en la mezcla de todos los ingredientes y se estimule la propagación de la levadura. Por experiencia hemos comprobado que un kilogramo de levadura requiere de 10-12 metros cúbicos de aire. En consecuencia, la cantidad de aire es enorme. Si el abasto de aire es insuficiente se reduce el crecimiento de la levadura.

Durante el proceso de propagación de la levadura se produce una gran cantidad de calor. Cada kilogramo de levadura genera 4500 kilo-calorías sin incluír el calor producido por los agitadores. La temperatura debe mantenerse entre 30-33 grados centígrados, durante el proceso de propagación, por ser la más favorable al desarrollo de la levadura. Para controlar la temperatura se suministra aire en grandes volúmenes y baja presión.

La construcción ó diseño del propagador es tal que el aire, la sacarosa y otros ingredientes se abastecen por el fondo y la batición en el fondo está mejor adaptada para el desarrollo de la levadura. Cuando se agita la batición la levadura subirá al tope del propagador. Durante a agitación el oxígeno, la sacarosa y los nutrientes son absorbidos por la levadura, incrementandose el bióxido de carbono. Evidentemente la capa del fondo entonces no resultará tan activa para el desarrollo de la levadura y se necesita incrementar la velocidad y el remolino. Al hacerlo se deben evitar burbujas de gran tamaño por medio de un agitador modificado; porque las burbujas grandes revelan que el aire no está siendo utilizado completamente.

Cuando las células de levadura alcanzan á cierto número el mosto se separa, filtra, lava y mezcla. Se ha elaborado la levadura. Sin embargo, la escala en que se ha producido en el pasado ha sido bastante limitada.

Erección de una moderna fábrica de levadura: Bajo el programa de ayuda de los Estados Unidos la Taiwan Sugar Corporation inició en 1955 un moderno proyecto de planta de levadura. La fábrica quedó instalada en Hsingying en Enero de 1957. Es probablemente una de las mayores del mundo. Su producción diaria alcanza á 40 toneladas de levadura y a 80 toneladas de alimentos. Para mejorar la calidad y reducir los costos, las restantes plantas de la empresa están siendo consolidadas á la planta de Hsingying.

El proceso de fabricación en ésta gran planta puede resumirse como sigue:

La materia prima generalmente empleada es miel final de caña, urea, sulfato de amonio, superfosfato y grandes volúmenes de aire y agua.

Se mide la miel final, se diluye á un Brix definido, se esteriliza á través de un esterilizador continuo relámpago y se purifica á través de un clarificador centrífugo de alta velocidad. El agua se purifica haciendola pasar por una serie de tanques de sedimentación, filtros y tanque de esterilización. El aire se toma del exterior de los edificios por medio de ventiladores de succión de alta velocidad, comprimido y pasado á través de filtros-tanques de algodón.

La miel de caña y los elementos nutrientes adicionales incluyendo urea, superfosfato, sulfato de amonio, aire y agua son alimentados contínuamente dentro de seis propagadores de levaduras, cada uno de 28 pies de diámetro y 15 pies de altura. Cada tanque propagador está especialmente equipado con un agitador para controlar la espuma, movido por motor de 350 HP. La capacidad de cada propagador es de ocho oneladas de letvadura base seca. La baición de levadura, conteniendo entre medio millón á un millón de células por centímetro cúbico se extrae en forma contínua de los propagadores.

El calor generado por el desarrollo de la levadura en los propagadores se extrae por medio de permutadores de calor, los cuales son enfriados por agua fría suministrada por tres unidades de refrigeración que producen un total de 1900 toneladas. Durante el tiempo frío del año las unidades de refrigeración son desviadas y por tanto no usadas.

La batición de levadura se concentra pasándola á través de separadores centrífugos. Existe una batería de 18 separadores. La levadura concentrada se lava con agua limpia y re-concentrada en separadores. Luego se seca por medio de 16 secadores de doble tambor. El polvo de levadura se tamiza y se mezcla en equipos especiales. La calidad de la levadura es, desde luego, estrictamente controlada por equipos é instrumentos de precisión en el laboratorio.

Conclusión: La producción principal de la Taiwan Sugar Corporation es azúcar. Sin embargo, se ha desarrollado la elaboración de distintos sub-productos: alcohol, levadura, tabla de bagazo, piña, cerdos, producos químicos agrícolas, etc. La finalidad ha sido apoyar las ventas de azúcar, incrementar las divisas y ampliar los mercados de exportación. La levaduras es, por tanto, uno de los diversos sub-productos elaborados por la Taiwan Sugar Corporation. Se le utiliza para consumo local y para exportación.

El Senador Anderson Apremia la Legislación Azucarera en 1961

En Junio 8 el Senador Clinton P. Anderson (Demócrata, Nuevo México), hizo uso de la palabra en la comida anual del Club Azucarero en Nueva York, demandando una legislación azucarera éste año y una mayor participación del mercado de los EE.UU. para los productores de azúcar de los EE.UU. El Senador Anderson, antiguo Secretario de Agricultura en la administración de Truman, señaló que desde Julio del año pasado, cuando fueron excluídos los embarques de azúcar de Cuba á los EE.UU., la antigua cuota cubana en éste mercado había sido adjudicada enteramente á productores de azúcar extranjeros. La industria doméstica, dijo, no ha recibido ninguna parte de la anterior cuota de Cuba. El Senador Anderson habló ante el Club Azucarero en el Hotel Savoy Hilton. Este acontecimiento anual cierra la temporada de 1960-61 de ésta organización internacional. Robert H. Shields, Presidente de The Sugar Club anunció que la lista de socios ha aumentado extraordinariamente durante el año pasado y que los miembros de la organización actualmente representan el comercio azucarero ó los gobiernos en el área de diez naciones situadas en los seis continentes.

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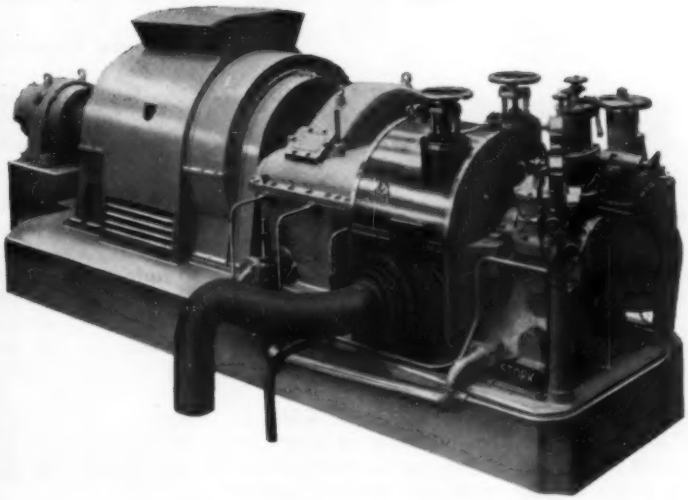

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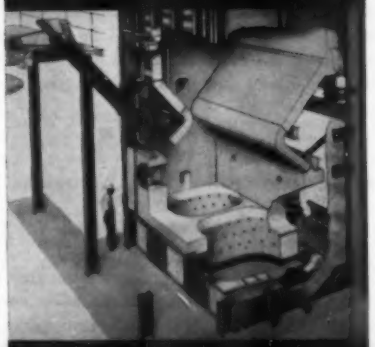

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Campo

Fomento de Variedades Monoembrión por el Método de Retrocruce

H. E. BREWBAKER, R. K. OLDEMEYER Y H. L. BUSH, *Journal Amer. Soc. Sugar Beet Tech., Vol. XI, No. 3, pp 252-257 (1960)*

Han transcurrido treinta y ocho años desde que Harlan y Pope informaron del éxito utilizando el método de retrocruce en la cría ó multiplicación de granos. Desde entonces el método de retrocruce ha sido usado con bastante amplitud por otros en el maíz, en un programa de resistencia á las enfermedades para la alfalfa, &. Este método ha sido particularmente útil en transferir un sólo carácter, el cual es únicamente heredado. En lo que respecta á la remolacha resulta un método conveniente para incorporar el carácter monoembrión (semilla de un sólo lóculo ó celdilla) á una variedad comercial establecida.

El método de retrocruce ha sido seguido para convertir una variedad comercial de la Great Western Sugar Co. de tipo multiembrión á monoembrión. Este trabajo técnico incluye dos tablas y un gráfico delineando el procedimiento usado para convertir la GW-674 al tipo monoembrión por el método de retrocruce. Resulta que despues de cruzar la variedad comercial GW con la SL-101 monoembrión y retrocruzándola sucesivamente cinco veces, el carácter monoembrión fué transferido con éxito á la planta padre GW sin pérdida de rendimiento ni de ninguna otra cualidad importante. Hay alguna evidencia de un ligero aumento en el contenido de azúcar sobre la periódica GW padre. La técnica del retrocruce ha probado ser muy útil para transferir el carácter monoembrión de una raza débil á una variedad altamente satisfactoria, por lo cual la distribución comercial ya ha sido hecha á los cultivadores. Y todo el estudio ha tomado menos de una década en completarse.

■

Cómo Producir Semillas Naturales Monoembrión

DR. L. A. SCHLOSSER, *Zucker, Vol. 13, No. 22, pp 562-564 (1960)*

La necesidad de usar semillas naturales monoembrión surgirá en Europa dentro de muy pocos años con el fin de evitar no poner en peligro el cultivo de la remolacha. Tambien en Europa se hará más y más difícil cada año encontrar suficientes obreros para los trabajos de la postura única de remolacha.

El cultivo de la remolacha en su forma actual es un elemento económico importante de los sistemas agrícolas intensivos Europeos. Con el propósito de mantener el cultivo de la remolacha á la altura de ésta etapa de intensidad agrícola, los geneticistas tienen que desarrollar una semilla que además de todas las cualidades de rendimiento, polarización, rendimiento en azúcar por hectárea, resistencia á la cernidura y manipulación técnica, posea caracteres de monoembrión ó monoyema.

Los grupos ó racimos de éstas semillas tienen que ser de tamaño medio, de tal manera que el pericarpio sea lo bastante grande para almacenar agua bajo las condiciones de sequía durante el tiempo de primavera. Además de ésto el rendimiento de semillas naturales monoembrión por unidad de área debe ser lo mas alto.

■

Fábrica

Enfriando Masas Cocidas "B" en Cristalizadores "Werkspoor"

Memoria Conv. Anual Deccan Sugar Tech. Ass., India, pp. 151-154 (1959)

Se puede ejecutar un sistema de tres templas, sin recirculación de mieles, aunque la pureza de la masacocida "A" sea de 92 si se hace el enfriamiento de las templas "B" en cristalizadores Werkspoor. Se puede obtener una considerable caída de pureza en la miel "B" para poder utilizarla en la confección de templas "C" de 60 de pureza, con una pureza promedio de 70 en el pié cristalizado. Se dan los detalles de las experiencias llevadas á cabo bajo condiciones diversas.

■

La Formación de Conglomerados por los Cristales de Sacarosa

M. KAMODA y T. YAMANE, *Memoria de la Sociedad Japonesa de Investigaciones sobre Refinación de Azúcar*, Vol. 8, pp. 123-130 (1959).

Se llevaron á cabo extensas experiencias de laboratorio para determinar las causas básicas de la formación de conglomerados por los cristales de sacarosa. Los resultados condujeron á las siguientes conclusiones:

(1) Mientras más alta la sobresaturación inicial, cuando la base es semillada; mayor resulta el número de conglomerados.

(2) El número de conglomerados disminuyó por agitación revolviendo; pero no pudo impedirse completamente.

(3) Mientras menor el tamaño de los cristales y menor la densidad de la semilla, mayor fué el número de conglomerados.

(4) Los conglomerados aumentaron extraordinariamente con la elevación de la temperatura.

(5) La adición de fructuosa, rafinosa, glutamato de sodio y glicolato de sodio determinaron un notable efecto depresivo á medida que la concentración de la substancia adicionada era disminuída.

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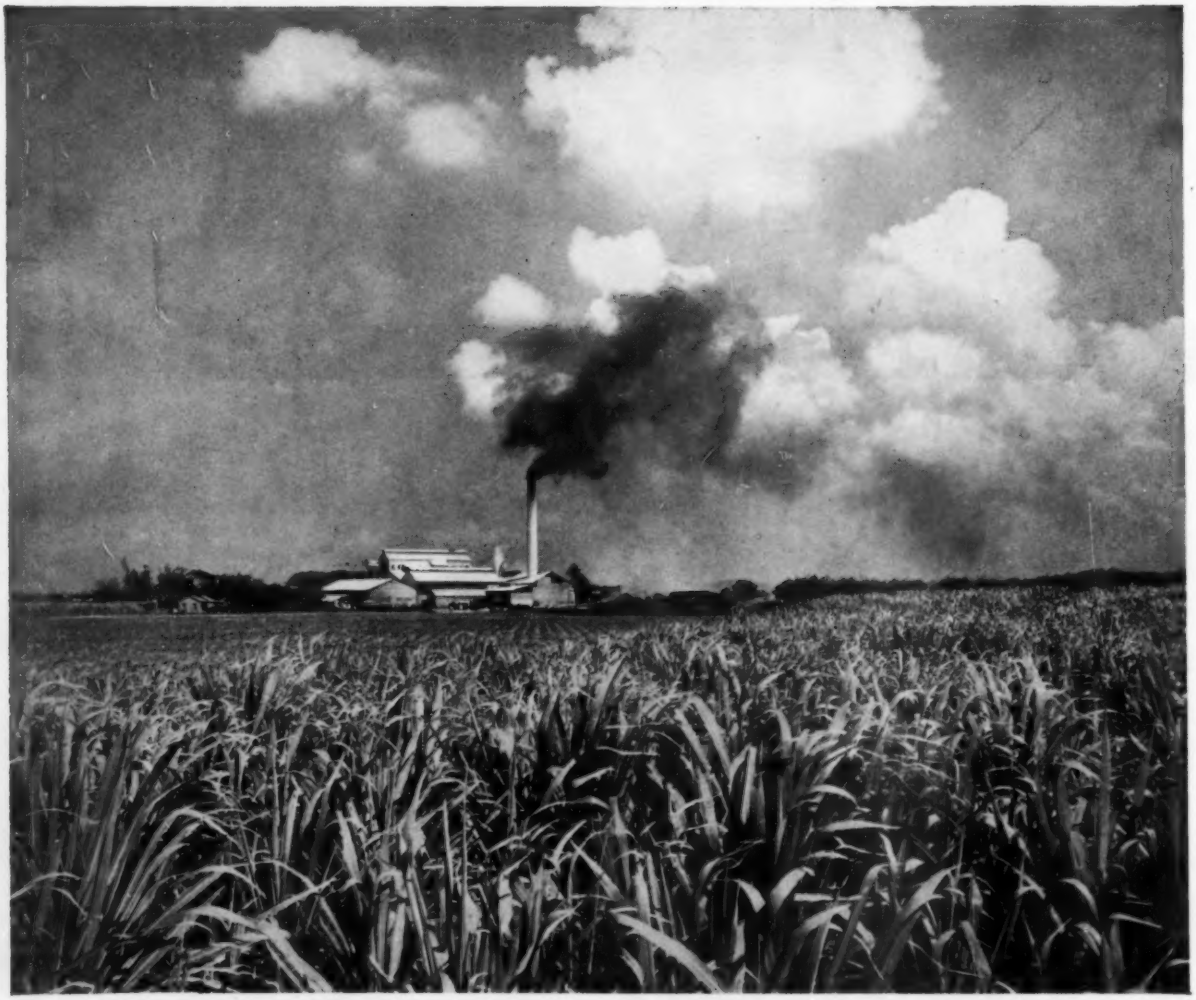

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(6) La glucosa en bajas concentraciones tenía un efecto acelerante; pero á más altas concentraciones tenía un efecto depresivo.

(7) Un agente coagulante (Sefaron 2610) tuvo un efecto acelerante sobre la formación de conglomerados.

(8) Hay una íntima relación entre los conglomerados y la velocidad de cristalización; esto es, los primeros resultan mayores á medida que la última aumenta. Sin embargo, cuando la velocidad de agitación revolviendo fué aumentada, los primeros fueron minorados, al mismo tiempo que la última disminuída.

■

Protección del Concreto contra la Acción del Azúcar

M.V. MILDENSTEIN, *Zucker*, Vol. 13, No. 8, pp. 205-208 (1960).

Bajo determinadas circunstancias las soluciones azucaradas ó el azúcar húmeda tienen un efecto corrosivo sobre el concreto; y el daño ocasionado es á menudo costoso para reparar. Esta acción puede ocurrir aún en los silos para azúcar blanca, en los cuales el azúcar almacenada tiene escasamente más de 0.1% de humedad. Para prevenir éstos inconvenientes se ha propuesto cubrir la superficie del concreto con un material á prueba de humedad tal como ortosilicato, aguavidrio, &. pero no resultan enteramente satisfactorios. Una firma Alemana (Fohlberg-List-Wolfenbuttel) anuncia una nueva capa de material que se afirma resulta realmente á prueba de humedad y azúcar. Este material es una epoxy-resina amino-endurecida, que se conoce por "Perfolon-L-extra". Los ensayos han demostrado que es muy superior al aguavidrio y los "fluates" como repelentes de la humedad y dando una superficie más resistente al uso. Además, resiste las soluciones salinas, ácidos diluídos y las grasas.

■

Una Centrífuga Contínua para Azúcar

FRANK PRICE, *Journal of the American Society of Sugar Beet Technologists*, Vol. XI, No. 3, pp. 243-251, (1960).

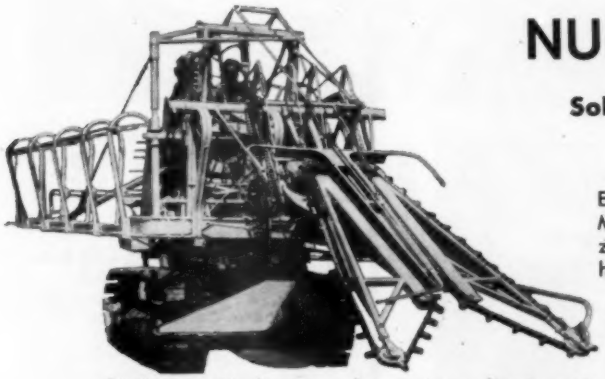
Durante 1958 se trajo de Alemania una centrífuga Hein-Lehmann, instalándola en Nampa, planta azucarera en Idaho de la Amalgamated Sugar Company. Resultó claro que era necesario hacer algunos cambios. Al finalizar la zafra en Nampa dicha máquina fué embarcada á los talleres de la Silver Works, desarmándola y haciendo un exámen de todas sus piezas; reanudándose el trabajo con un diseño mejorado que hiciera el equipo aceptable á las prácticas Americanas. En 1959 se instalaron centrífugas contínuas Silver en las fábricas de azúcar de remolacha Loveland y Johnstown, en Colorado, pertenecientes á la Great Western Sugar Company; y en Nampa, la planta en Idaho de la Amalgamated Sugar Company.

Los resultados de las pruebas se muestran en cuatro tablas. Los gastos de mantenimiento de la centrífuga contínua han sido insignificantes, conforme se esperaba de diseño tan simple. La comparación de los resultados demuestra que éstas centrífugas contínuas hicieron tan bueno ó mejor trabajo que las antiguas máquinas por cargas intermitentes; sin embargo, los tipos modernos de centrífugas por cargas producirán azúcar de más elevada pureza. Compensando ésta desventaja están: la operación prácticamente libre de supervisi;n, el bajo consumo de fuerza, el bajo costo de mantenimiento y la baja inversión inicial de capital de la centrífuga contínua Silver.

J & L ENGINEERING CO. OFRECERA

NUEVO CURSO ESPECIAL

Sobre Cosecha Mecanizada de la Caña



La J. & L. Engineering Company, Inc. de Jeanerette, Louisiana, Estados Unidos, fabricantes de los equipos agrícolas cañeros "Cane Master," ofrecerá un curso corto objetivo relacionado con la mecanización de las distintas labores agrícolas de la caña de azucar, haciendo énfasis especial en la cosecha mecanizada.

Los aspirantes á este curso deberán ser personas con conocimientos básicos y prácticos de la agricultura de la caña de azucar especialmente en el campo de la maquinaria agrícola, ya que la mayoría de las conferencias serán objetivas tratándose con los equipos directamente en el campo. Aunque se generalizará sobre diseños de campos, equipos para preparación de tierras, confección y limpieza de zanjas, cultivos, aplicación de fertilizantes y herbicidas, etc., la mayor parte del tiempo se dedicará a los equipos para cosechar caña mecánicamente, tales como cortadoras de distintos modelos, cargadoras montadas en llantas y orugas, cargadoras contínuas, carros ligeros y trailers para el transporte de la caña, grúas y trasbordadores, etc.

Este curso será efrecido en Español é Inglés, habiéndose fijado el Lunes 23 de Octubre de 1961 como fecha tentativa para su comienzo. La duración será de unas dos semanas. Las inscripciones deberán estar en las oficinas de la Compañía antes del dia Iro. de Octubre de 1961.

J & L Engineering Company, Inc.
P.O. Box 326
Jeanerette, Louisiana, U.S.A.

Favor remitirme información adicional sobre su curso especial de entrenamiento en la cosecha mecanizada de la caña de azúcar.

NOMBRE .....

EMPRESA .....

DIRECCION .....

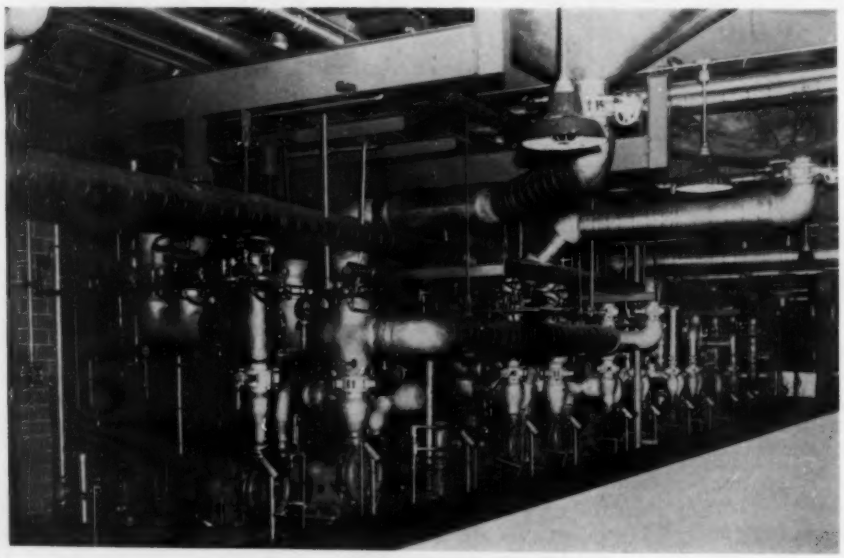
PAIS ..... CARGO .....

La Conferencia de 1961 de los Tecnólogos de Queensland

La Sociedad de Tecnólogos de la Caña de Azúcar de Queensland se reunió en Bundaberg en Abril 12 último para discutir los siguientes trabajos técnicos: *Sección de Agricultura:* Azúcar por Acre, L. G. Vallance; Variaciones en los Rendimientos, A. G. Barrie; Planes sobre Multiplicación de la Caña en los Distritos del Sur, J. H. Buzacott; Necesidades Varietales y Cambios en la Composición Varietal, J. Anderson; Parcelas de Variedades para Fines Especiales, N. McD. Smith; La Enfermedad de la Escaldadura de las Hojas en Queensland, C. G. Hughes; La Incidencia de la Escaldadura de las Hojas en el Area de Tully, E. H. Fox; Deficiencias del Cobre y su Control, B. T. Egan y G. H. Whitaker; Experimentos con la Mosca Soldado, R. B. Moller; Algunas Notas sobre el Control de las Ratas, S. Greenaway; Cuando Regar, E. Round; La Salinidad en Algunos Suelos de Queensland, K. C. Leverington. *Sección de Elaboración:* Observaciones Adicionales sobre Molienda y Alimentación de los Molinos, H. D. Donnelly; Mejorando el Trabajo de las Fábricas Pequeñas, H. Mackay; Notas sobre Mejoras en la Planta de Moler, C. H. Fitzmaurice; Influencia de la Preparación y la Alimentación á los Molinos sobre la Extracción de Jugo, J. D. Perry; Economías Verdaderas de Combustible en las Fábricas de Azúcar de Caña, G. H. Jenkins; Ensayos de Estiramiento por Presión (Extrusion) en la Compresión del Bagazo, J. E. Holt; Estudios sobre Molienda—los Efectos de la Fibre y del Diámetro de las Mazas, C. R. Murry; Los Efectos de la Carga y la Velocidad sobre un Molino Presionado Hidráulicamente, C. R. Bagley; Los Efectos de la Finura sobre la Permeabilidad de la Caña Preparada, J. E. Holt; Notas sobre la Regulación de los Molinos, W. R. Crawford & J. A. McGinn; Proyecto de Investigaciones sobre Molienda, D. S. Shann; Investigación sobre Turbinas de Vapor Impulsoras de Molinos, H. P. Smart. *Sección General:* La Sacarosa y la Industria Química, H. H. Hatt; Control Automático del Múltiple-Efecto, G. A. Anderson & K. A. Stuart; Contabilidad Mecanizada para el Central Azucarero, G. A. Chenery; Algunas Impresiones sobre la Industria Europea de Azúcar de Remolacha, B. J. Rutherford.

Ingeniero Químico

Emile C. Freeland acaba de completar sus dos años como Ingeniero Químico de la Misión de Operaciones de los EE.UU. en Tel Aviv, Israel; y ha asumido el cargo de Ingeniero Químico de la Misión en China, Taipei y Taiwan de la Administración de Cooperación Internacional para Seguridad Mutua; esperando permanacer en dicha posición los dos próximos años.



Notable fotografía de 12 del total de 89 Bombas Goulds instaladas en la nueva refinería Domino de la American Sugar Refining Company en Boston, Mass. La fábrica fué detalladamente descrita en la edición de Junio de 1961 de Sugar y Azúcar. Bombas de bronce manipulan licores azucarados, siropes, aguas dulces y suspensiones de azúcar. Bombas construídas de aleaciones metálicas manejan el ácido fosfórico y se usa una bomba de acero inoxidable para la solución de carbonato de sodio. La firma Goulds también suministró 16 bombas para agua, con dos unidades de etapas múltiples para bombear retornos ó agua condensada á 190°F.

CONTROL

Para mayor información, comuníquese con el representante de CUTLER-HAMMER más cercano

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Intec International S. A.
Florida 323

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Carrera 10, No. 14-56

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Cano Gutierrez Ltda.
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Cali:
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Calle 12 No. 1-12

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Costa Rica Engineering Co. Ltd., Box 3042

Chile—Santiago:
Carr y Cía. S. A. C.
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El Salvador—San Salvador:
R. J. López, Box 675

Guatemala—Guatemala:
Felix Montes & Cía. Ltda.
8a Calle 3-27, Zona 1

Haiti—Port-au-Prince:
Charles Fequiere & Cie.
Box 398

Honduras—Tegucigalpa, D.C.:
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Jamaica—Kingston:
Masterton Ltd., Box 73

México—México D.F.:
Cutler-Hammer Mexicana, S. A.
Poniente 44, No. 3413

Sociedad Electro-Mecánica, S. A.
Manuel Ma. Contreras No. 25

Nicaragua—Managua:
Reyes & Jacobson Cía. Ltda., Apartado 1749

Panamá—Panamá:
Cía. Servicios Eléctricos, S. A.
Apartado 676

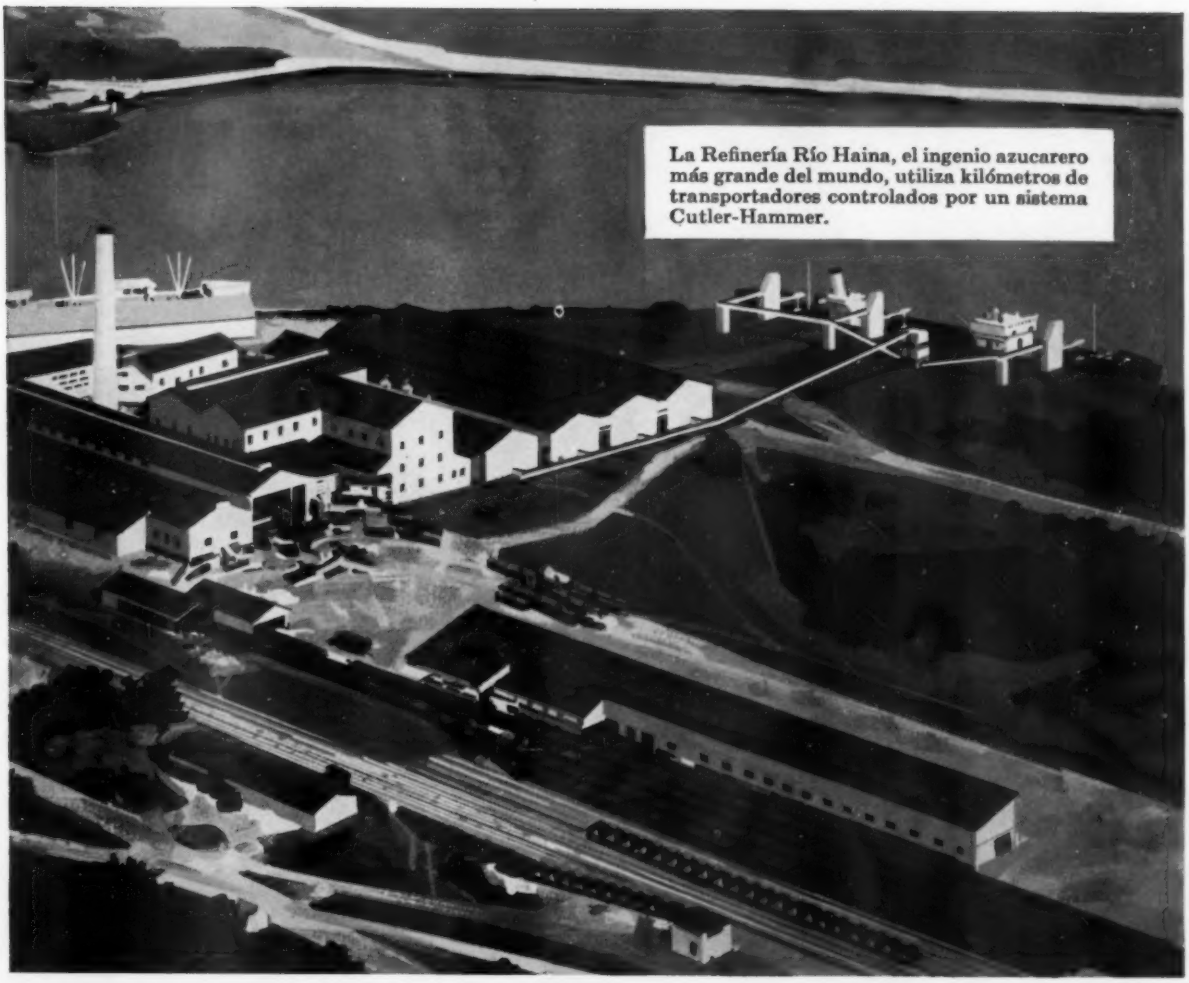
Perú—Lima:
Elecsa, S. A., Apartado 4618

Puerto Rico—San Juan 23:
Marina Electrical Supplies, Inc., Box 4526

República Dominicana
Ciudad Trujillo:
Importadora Tropical, C por A., Apartado 750

Uruguay—
Intec International, S. A.
Florida 323
Buenos Aires, Argentina

Venezuela—Caracas:
Marketing Associates C.A.
Apartado del Este 11316



La Refinería Río Haina, el ingenio azucarero más grande del mundo, utiliza kilómetros de transportadores controlados por un sistema Cutler-Hammer.

Sean kilómetros de transportadores, o un simple circuito... ¡Cutler-Hammer los controla mejor!

Este complicadísimo sistema de transportadores, integrado con tableros de control central, conduce el azúcar a granel desde los trapiches y el ingenio hasta los depósitos de almacenamiento y, finalmente, a los almacenes de embarque.

Es uno de los sistemas de acarreo de materiales más eficientes del mundo. ¡Un modelo de automatización para el presente decenio!

Ya sea que usted necesite sistemas complicados de control, o un buen equipo para la entrada de servicio en residencias o edificios comerciales, recuerde que Cutler-Hammer posee los materiales y conocimientos para hacer el mejor trabajo.

El representante de Cutler-Hammer más cercano tendrá sumo agrado en brindarle su cooperación. Llámelo en cuanto inicie usted los planes.

Nuevo Interruptor Automático de Seguridad en hermoso estilo moderno. Su compensación superior de la temperatura ambiente, que lo distingue, garantiza su exacto funcionamiento en todos los climas.

¿ALGO NUEVO? DIRIJASE A...

CUTLER-HAMMER

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CONTROL

NORIT® SUPRA

para mejor azúcar refinado

NORIT

UNITED NORIT SALES CORPORATION LTD - AMSTERDAM - HOLLAND

Peso de embarque, 2860 kg • Motor de 40 cf

NUEVO Y COMPACTO TRACTOR DE ORUGAS

que trabaja como uno grande

El nuevo tractor diesel de orugas Allis-Chalmers HD-3 puede realizar muchos trabajos para los que ahora se emplean tractores grandes — ahorra en combustible y otros gastos de operación y substituye a tractores grandes que entonces pueden usarse para realizar trabajo pesado . . . ahorra dinero todo el tiempo que está trabajando en el campo.

Considere lo que puede hacer este tractor: trabaja con un arado grande de tres rejas o de tipo lister, remolca fácilmente rastras pesadas de discos, o cinceles, subsoladores; arrastra carretas cargadas de caña desde el campo, mueve carretones y trabaja con los equipos de limpieza del central azucarero. Provisto de una hoja bulldozer, sirve para construir y mantener caminos rurales y despejar terrenos.

El HD-3 ofrece la misma excelente tracción positiva y flotación que los otros tractores de oruga Allis-Chalmers más grandes . . . pero es de un nuevo tamaño económico. Sus largas orugas y buen equilibrio permiten utilizar su peso provechosamente. Los bastidores reforzados de acero de las orugas y el bastidor principal de resistencia extraordinaria convierten a este tractor en el más fuerte y resistente entre los de su tamaño.

El cliente puede escoger entre dos sistemas de transmisión que se manejan con embrague manual: (1) el Director de Potencia de 10 velocidades (8 de avance y 2 de retroceso) que permite al operador cambiar de la escala alta a la baja estando el tractor en marcha, para aumentar la fuerza de tracción sin trastornar los engranajes, o (2), el embrague de VAIVEN que permite cambiar instantáneamente de dirección, hacia adelante o hacia atrás, con una sola palanca.

Hay disponible un surtido completo de implementos — para usar ya sea con barra de tiro o con un enganche de 3 puntos.

Este tractor de orugas es algo completamente nuevo — un tractor compacto que funciona como uno grande. Para obtener detalles completos, consulte al Distribuidor de Maquinaria Agrícola Allis-Chalmers en su región, o escríbanos directamente.

ALLIS-CHALMERS INTERNATIONAL
Departamento AZ761, Milwaukee 1, Wisconsin, U.S.A.

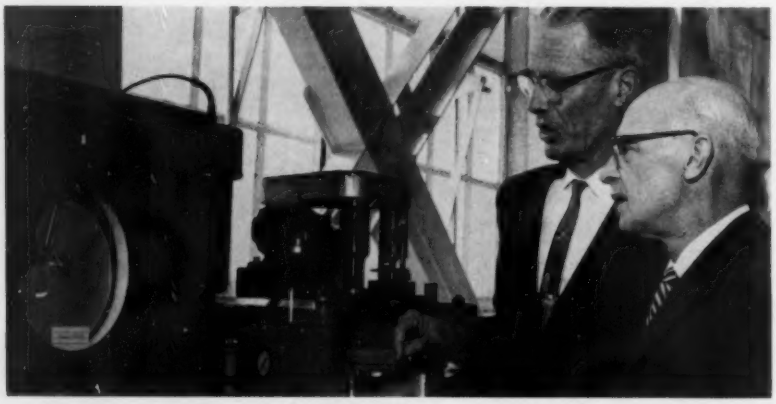
FABRICANTES DE MAQUINARIA
DESDE 1847

ALLIS-CHALMERS

DICALITE® TECHNICAL REPORT

DICALITE DEPARTMENT • GREAT LAKES CARBON CORPORATION • 612 SO. FLOWER ST., LOS ANGELES 17, CALIFORNIA

El Uso de los Auxiliares Filtrantes Dicalite en la Refineria de Azucar C & H



C. W. Beal, tecnólogo de la C & H y George B. Bregar, de la Dicalite, tratan sobre el funcionamiento del filtro de presiones variables utilizado en el laboratorio de la C & H para el avalúo del funcionamiento de los auxiliares filtrantes.

Entre las numerosas refinerías que emplean Dicalite para la filtración, la California and Hawaiian Sugar Refinery Corporation ocupa un elevado lugar con respecto á nosotros, por cuánto ellos han estado comprando Dicalite por más de 30 años.

La C & H, la organización para refinar y poner en el mercado toda el azúcar de los productores de Hawaii. vende en 27 estados y es reconocida como inspiración y guía de la industria. Su planta de Crockett, en la bahía de San Francisco, es la mayor unidad de refinación de azúcar del mundo, elaborando alrededor de 800,000 toneladas de azúcares refinados de distintos tipos al año.

J. L. Meikle, Superintendente del Proceso de Elaboración de la C & H, comprueba la claridad de los licores decolorados, filtrados por los Sweetland.

En ésta refinería los auxiliares filtrantes Dicalite se usan en la clarificación de los licores de azúcares crudos afinados y en los licores decolorados con carbón de huesos. A los filtros Sweetland se les suministra una pre-capa con Dicalite Speedplus,® usando 0.3 lbs. por pié cuadrado de superficie filtrante. Se usa Dicalite Speedplus dentro de los licores que se alimentan, en cantidades cuidadosamente reguladas de acuerdo con las características de cada lote de licor azucarero en particular. La filtración promedia 10 galones por hora por pié cuadrado de superficie filtrante sobre licores decolorados.

Aunque la filtración de los crudos afinados es probablemente la más importante en la refinación de azúcares de caña, numerosas refinerías hacen uso lucrativo del Dicalite en la filtración de altos licores de azúcares crudos re-derretidos y siropes de afinación. Un ingeniero de servicios de la Dicalite tendrá mucho gusto en tratar con Vd. las posibles ventajas de la filtración Dicalite en su proceso particular de refinación. Escriba usted á: Departamento Dicalite, 612 So. Flower St., Los Angeles 17, California.

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SUIZA ● (La misma de Italia)
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Este diesel alemán de 39 HP es solo uno de los muchos tractores International en uso en el gran ingenio San Cristóbal.

El tractor de carriles International TD-9 transporta el bagazo y realiza muchos otros trabajos propios de un ingenio.

REDUZCA GASTOS EN LA ZAFRA

con los económicos equipos IH

Durante la zafra, 300 tractores International y 2000 carros para caña transportan en San Cristóbal enormes cantidades de caña, para producir diariamente 1300 ton. de azúcar.

Los tractores e implementos de International Harvester ayudan a cumplir el trabajo rápida y económicamente en el cultivo y zafra de la caña de azúcar.

En el campo: La IH en México y E.U.A. produce un renglón completo de implementos: para arar, remover, rastrillar, cultivar, preparar y formar lomos. Para la labranza mecanizada, hay tractores de ruedas McCormick International y de carriles International, durables y económicos.

Del campo al molino: El carro para cañas ME 12-55, hecho en México, es insuperable para cargar y transportar rápidamente las cañas. Aun con carga de seis toneladas, no es pesado para remolcar; los largos trenes son arrastrados por tractores hechos por IH en Alemania, Inglaterra, o E.U.A.

INTERNATIONAL HARVESTER

Pida al distribuidor International que le dé más detalles sobre equipos para el cultivo y zafra de caña.

INTERNATIONAL HARVESTER

International Harvester Export Company, 180 N. Michigan Ave., Chicago 1, Illinois, U.S.A.

89 Bombas Goulds se utilizan en la nueva refinería Domino de la American Sugar Refining Company en Boston.

Los metodos modernos de refinacion exigen modernos equipos de bombeo!

Equipos de bombeo seguros y confiables son vitales para operar la nueva refinería Domino de la American Sugar Refining Company en Boston. En ésta refinería, la primera enteramente automatizada, se necesita imperativamente una vasta formación de bombas para las numerosas operaciones de transferir, circular, extraer de sumideros y otros servicios.

Los ingenieros de la Goulds trabajaron estrechamente con los ingenieros de la American Sugar en el diseño, así como con el cuerpo directivo de la Bechtel Corporation. Ellos seleccionaron, entre la amplia variedad de diseños Goulds, los tipos, tamaños y materiales ó aleaciones de construcción, para asignar las unidades de bombas más eficientes y económicas para cada necesidad y caso individual.

Un elevado grado de standardización fué logrado al poder escoger 58 bombas del mismo diseño, entre el total de 89 Bombas Goulds instaladas . . . el Modelo 3715 de bombas centrífugas de succión al extremo . . . lo que además permite mantener un inventario mínimo de piezas de repuesto. La mayoría de éstas unidades son todas de bronce ó rellenas de bronce y manipulan soluciones de azúcar en diversas formas, tales como azúcar líquida, siropes de azúcar, aguas dulces y suspensiones de azúcar. El ácido fosfórico se maneja por una bomba de construcción con aleación FA-20; en tanto que una bomba de acero inoxidable No. 316 se utiliza para las soluciones de carbonato de sodio.

Cuando tenga que hacer frente á problemas de bombeo en su propia refinería ó cuando inicie el estudio de una planta enteramente nueva, porqué no seguir el ejemplo de uno de los líderes mundiales en la producción de azúcar y llama á los ingenieros de la Goulds para tener su cooperación y consejos?

Escriba ó llame por teléfono á la Sucursal más próxima de Goulds, ó su Representante, ó escriba á Goulds Pumps, Inc., Dept. SY-61, Seneca Falls, N.Y.

GOULDS PUMPS

Goulds Pumps International, New York

La Rayo Clorótica

(*Viene de la página* 49)

sobre la enfermedad de la raya clorótica proporcionan una explicación sobre el comportamiento errático de la enfermedad en el campo y una comprensión de la complejidad del mecanismo fundamental de la infección y la propagación. Las observaciones en el campo de la enfermedad y las mencionadas evidencias de la investigación permiten afirmar que los factores siguientes están inter-relacionados con respecto á la infección de la planta:

(I) La concentración de las partículas del virus liberado desde el sistema de raíces de las plantas enfermas y presente en el suelo;

(II) Asociación del agua libre del suelo con el sistema de raíces de plantas sanas;

(III) Temperaturas del suelo; y

(IV) "Poder para inhibir la infección del virus" del suelo.

Referencias

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Marruecos

(*Viene de la página* 51)

empresa SOMASUC está tratando de establecer una fábrica de azúcar de remolacha en Gharb con una capacidad diaria de 1,500 toneladas, operando cien días. Esta planta permitiría industrializar 150,000 toneladas de remolachas cultivadas en unas 5,000 hectáreas de terreno. Esperan poder cultivar unas 80,000 hectáreas, capaces de producir unas 100,000 toneladas de azúcar, en un plan de desarrollo progresivo durante los próximos diez años. Fomentando otras regiones adicionales, Marruecos espera en veinte años poder producir toda el azúcar de su consumo doméstico.

En 1958 Marruecos se adhirió al Acuerdo Internacional Azucarero y en Noviembre de 1959 se celebró en Tánger la Conferencia Internacional Azucarera. Recientemente se organizó una asociación en Casablanca agrupando á los importadores de refinos así como á algunos importadores de crudos. La industria azucarera vá gradualmente convirtiéndose en organizada y productiva.

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DICALITE® TECHNICAL REPORT

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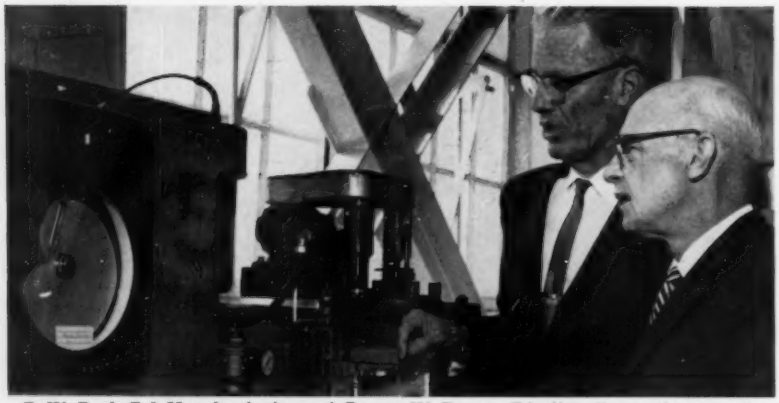
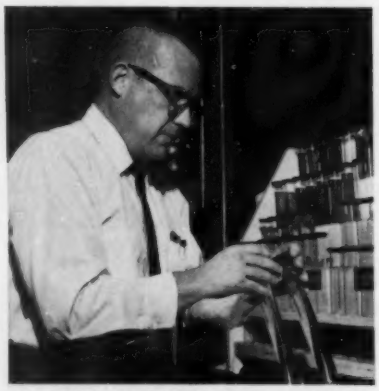
Dicalite Filteraid Usage at C & H Sugar



C. W. Beal, C & H technologist, and George W. Bregar, Dicalite, discuss the operation of the variable pressure filter used in the C & H laboratory to evaluate the performance of filteraids.

Among the many sugar refineries who employ Dicalite in filtration, the California and Hawaiian Sugar Refinery Corporation has a high place in our regard, for they have been purchasing Dicalite for more than 30 years.

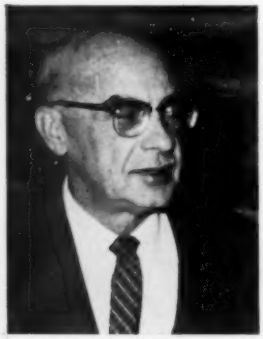
C & H, the refining and marketing organization for all the sugar producers in Hawaii, markets in 27 states, and is recognized as a leader in the industry. Their refinery at Crockett, on San Francisco bay, is the largest single refinery in the world, producing nearly 800,000 tons of finished sugars a year.



J. L. Meikle, C & H Superintendent-Process, checks the clarity of Sweetland-filtered char decolorized sugar liquors.

In this refinery, Dicalite filteraids are used in the clarification of washed raw sugar liquor and bone char decolorized liquors. Sweetland filters are precoated with Dicalite Speedplus,® using 0.3 lbs/ft^2 of filter area. Dicalite Speedplus is used for the body feed, in amounts carefully regulated to the characteristics of the particular batch of sugar liquor. Throughput averages 10 gal/hr/ft^2 of filter area on decolorized liquors.

Though the washed raw filtration is probably the most important in the refining of cane sugars, many refineries make profitable use of Dicalite in the filtration of high raw remelt sugar liquors and affination syrups. A Dicalite service engineer will be glad to discuss with you the possible advantages of Dicalite filtration in your individual refining process. Write: Dicalite Department, 612 So. Flower St., Los Angeles 17, Calif.



George W. Bregar

Dicalite's "Man on the Spot"

George Bregar joined the Dicalite Technical Department in 1945. For 6 years his efforts were devoted primarily to research and product development, with additional work on quality control, customer service and field testing. George's research on diatomite processing paid off in a U.S. patent, which was assigned to Great Lakes Carbon Corporation.

Since 1951, Bregar has been serving Dicalite users in the San Francisco Bay area and in the Northwest.

Before joining Great Lakes Carbon, George had 15 years experience in metallurgical and mineralogical work, the last 4 with the U.S. Bureau of Mines. Here he developed analytical methods for spectrographic determinations and other analyses of strategic ores. He majored in chemistry at Geneva College.

Bregar is a member of the Master Brewers Association of America, the California Laundry and Drycleaners Association, and the American Society of Sugar Beet Technologists. He is also associated with the American Society of Enologists.

TECHNICAL LITERATURE

on Dicalite Filteraids is available on request. Bulletin B-14 discusses the principles and operating practices of filteraid filtration, and its applications in many industries. Write for your copy to Dicalite Dept., 612 So. Flower St., Los Angeles 17, Calif.

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